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MACWORLD

THE MACINTOSH® MAGAZINE

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Centris 650 & 610
Reviewed, Page 128



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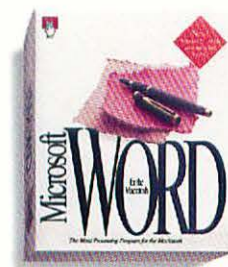


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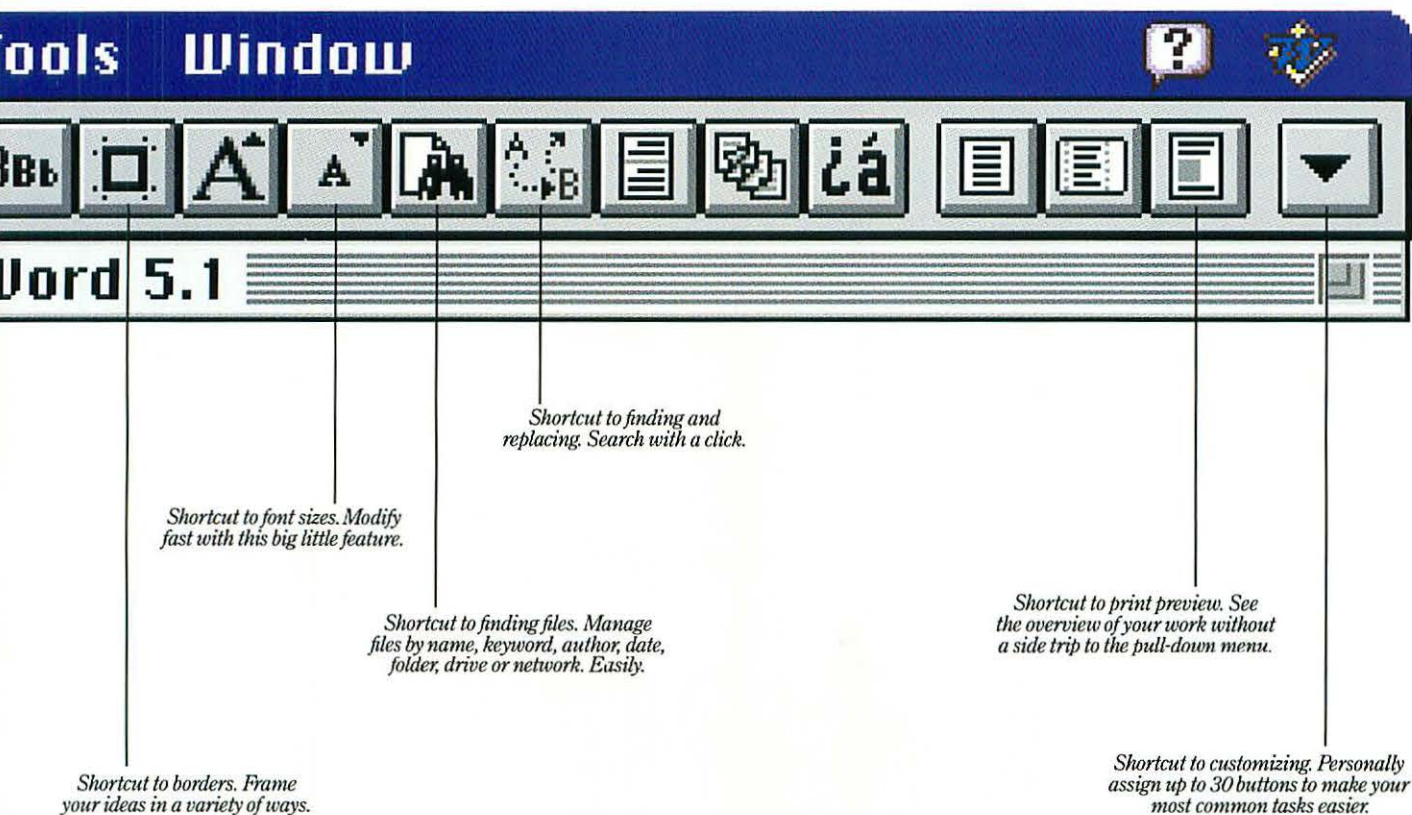
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Circle 244 on reader service card

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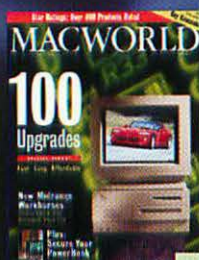
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MACWORLD EDITORS
PICK THE BEST OF
TODAY'S WIDE-
RANGING UPGRADE
OPTIONS;
COMPREHENSIVE
COVERAGE BEGINS
ON PAGE 84.
(PHOTO BY PAUL
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SCREEN IMAGE BY
GUY SPANGENBERG.)

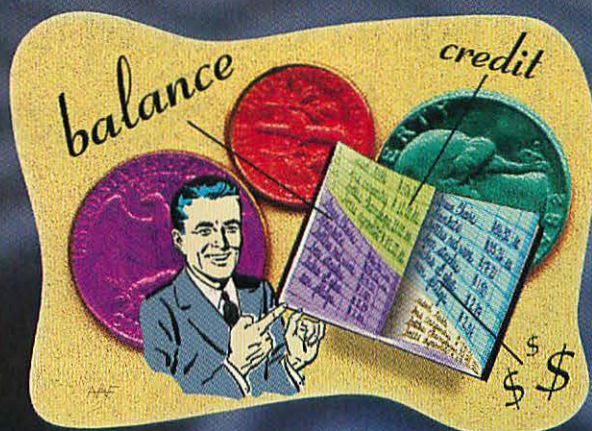
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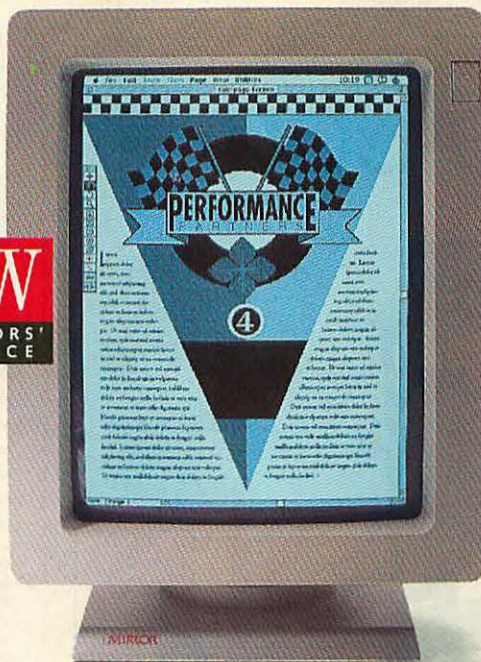
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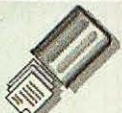
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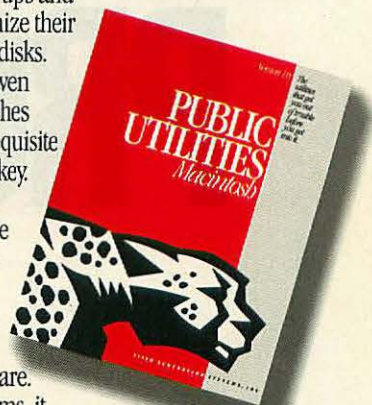
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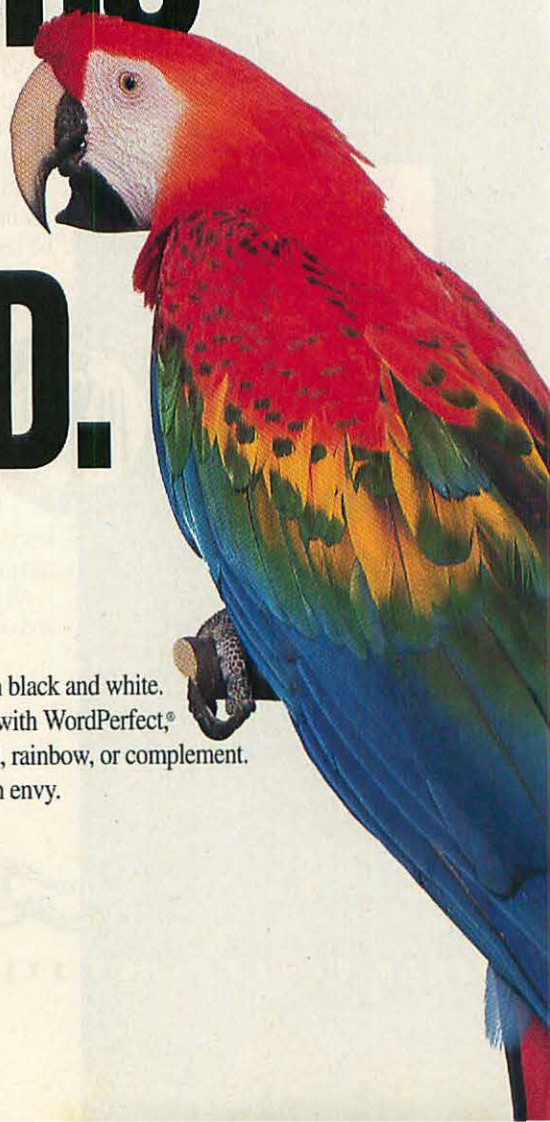
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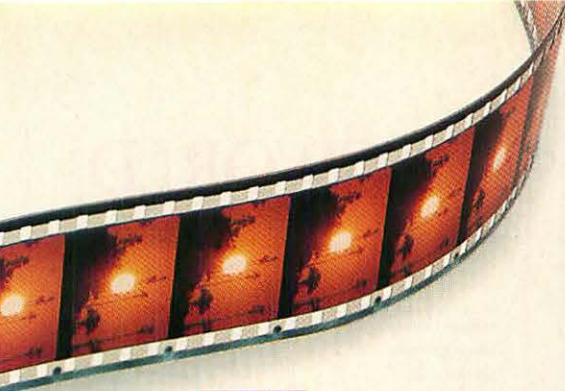
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PLANNED GROWTH

To Matthew Long, a just didn't make sense. His beloved hometown of Elmer, Maine, had a history of being a place where the big pizza-hut factory opened in nearby Hudson. Workers—who have done much to give the local economy a boost—are leaving, even voting up in their representatives. Some are even leaving in cars.



Affordable new homes for these workers. Unfortunately, that's the last thing the Elmer Zoning Board wants to happen.

Like any city, Elmer has enough houses. "We have to control our growth," says Gary Mellick, longtime resident and zoning board member. "We don't want any more houses than the ones we have now."

While the current recession has generally slowed much of this country's growth problems, in some areas it has not slowed at all. In Las Vegas, population increases



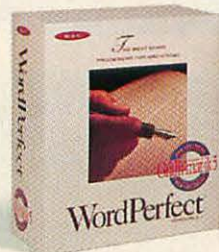
LAS VEGAS—Ever wonder what came of the desert town, once a quiet people town, then, between 1970 and 1990, its population almost doubled. By 1990, over a quarter of the population were calling it home.

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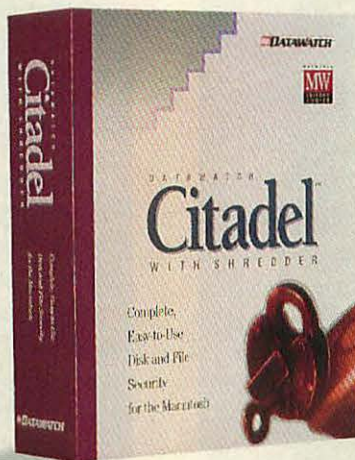
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**10:12
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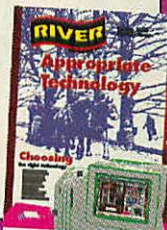
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MacBulletin

LATE-BREAKING NEWS

Quadra 800 Problems: Difficulties when using some 8MB and 16MB 72-pin SIMMs have led Apple representatives to recommend not using composite SIMMs in the LC III, Centris 610 and 650, and the Quadra 800. A composite SIMM uses lower-capacity chips in greater numbers; for example, a 16MB SIMM might use four times as many 4-megabit DRAM chips instead of more-expensive 16-megabit chips. Additional circuitry needed to make the more numerous chips work like fewer, higher-capacity DRAMs can slow down the SIMM, leading to timing problems with the memory bus, corruption of data, and crashes. Choosing composite SIMMs with slightly faster RAM than normally needed for your Mac may prevent the timing problem, although Apple does not endorse this approach.

Clone Heads to Market: NuTek U.S.A. (408/973-8799), last heard from in early 1991, says it's shipping the NuTek One, a \$1599 Mac clone with a 33MHz processor, three NuBus slots, 1MB of RAM, an 80MB hard drive, a mouse, and a keyboard. The NuTek Duet, a dual-processor Mac-compatible computer that also runs DOS and Windows software, is available directly from NuTek and will be sold through dealers. One drawback: computers using the current NuTek technology can't run some Mac programs, including Excel.

MacWrite Pro Sighted: Claris (408/727-8227) is now shipping MacWrite Pro, originally announced in early summer 1991. The word processor has a frame-based interface with a floating palette, desktop publishing capabilities, a table

editor, sticky notes, and style sheets for both paragraph and character formatting. Pro will be \$249 for first-time users; \$69 for an upgrade.

Making Apps Centris-Friendly: Alys (415/566-2263) has upgraded its Compatibility INIT to version 3.2 with support for the Quadra 800 and the Centris 610 and 650. The \$99.95 system extension allows older versions of applications and desk accessories to run on the 68040-based Macs with the high-speed memory cache turned on; the extension recognizes programs that are incompatible with the cache.

Mr. Newton to the Courtesy Phone: Siemens is working on NotePhone, a combination of a telephone and other communications technology that will work with Apple's upcoming Newton PDA. The first NotePhone will accept a Newton as a plug-in device, while future NotePhones may communicate with Newtons wirelessly.

Disinfectant Upgraded: Version 3.0 of Disinfectant, a popular and free antivirus utility, has been updated to block the new T-4C virus. Disinfectant is available from most commercial online systems and user groups.

Apple's PowerCD: This CD ROM drive is compatible with Kodak's Photo CD and displays Photo CD images when hooked up to a Mac or a TV. To list for under \$500, the portable PowerCD weighs about 3 pounds, can be battery-operated, and is expected to include an AC adapter, a remote control for Photo CD operations, and a cable for connecting to a TV. The drive is slated to ship this summer; pricing and availability are not set. **m**

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Clone Alone

BY ADRIAN MELLO

The clones are back. Every few years something happens to get the Mac community revved up about the possibility of Mac compatibles. The latest development was the announcement by NuTek U.S.A. that it is finally shipping a "Macintosh work-alike" system that runs most Macintosh software applications. NuTek doesn't consider its system a Mac clone "because the hardware is almost totally different and the operating system software was carefully coded without reference to Apple's Macintosh Operating System," according to G. Gervaise Davis III, NuTek's attorney. This distinction will be lost on most end users, who will continue to call any work-alike a clone.

The NuTek board that goes to third parties, the NuTek One, employs a 33MHz 68030 processor and has three NuBus slots. Third parties can buy the system software and board, then combine them with keyboards, monitors, disk drives, and other peripherals. NuTek itself is offering end users the Duet, a hybrid system that has a 68030 and an 80486 processor, for running Mac and DOS or Windows applications. The Duet also has two NuBus slots for Mac add-in boards, and two ISA slots for boards for DOS machines. Unfortunately, neither the NuTek One nor the NuTek Duet is compatible with ADB devices, so you couldn't swap keyboards or pointing devices between it and your Mac.

No Clones on This Bus

ONE OF THE DEFINING CHARACTERISTICS of the Mac market has been the absence of successful clones. In the world of DOS and Windows PCs, hundreds of vendors offer computers that run the same operating systems and applications. But Apple has repeatedly proven its willingness to take all challengers to court and its ability to win—witness the death of Franklin Computer. The only recent exception is Quorum Software Systems, which does not compete with Apple for hardware systems sales. Quorum, which makes software that lets Mac applications run on Unix machines and other higher-end systems, recently won a suit against Apple. With a relatively large war chest at

its disposal, NuTek appears to be reasonably well prepared for the inevitable legal onslaught from Apple. It does seem fated that the two companies will soon disagree in court over whether NuTek is infringing on Apple's intellectual property.

Whatever the outcome of the legal battle between these two companies, it's interesting to consider the potential role of Mac clones. Whether or not NuTek wins in court, it and any other future Mac-clone companies must compete in the marketplace. When NuTek began its development several years ago, Apple was an overmargined fat cat, charging top dollar for its high-quality technology. At the time, clones were an appealing notion because they would have made the Mac experience available to more people. Since then, Apple has changed its strategy and decided to improve its share of the personal computer market. Over the last couple of years Apple has slashed prices and now offers competitively priced products, including three models powerful enough for business use and priced under \$2000 (the LC III, the IIfx, and the Centris 610).

Enter NuTek, quite some time after its cue. The key selling point of a clone is usually price. In the early DOS market a clone had to be about 20 percent cheaper and 20 percent faster to sell against IBM. Dealers and resellers will be able to purchase the NuTek board and system software for \$899. A NuTek spokesperson told *Macworld* that you should be able to purchase a complete, assembled NuTek-based system, comparable to a Mac IIfx in capability, for around \$2600 to \$2700. If you build the system yourself, it would cost around \$1600 to \$1700. Most people don't want to build their own computer, so when you compare Apple- and NuTek-assembled systems including a hard drive, monitor, and keyboard, the prices are likely to be within \$100 or \$200 of each other. Given that the NuTek work-alike won't be Apple labeled and—more important—won't initially support all system-software features or all applications, most buyers will not

be persuaded unless there is a bigger price difference. NuTek may have room to maneuver on price and operate on lower margins than Apple, given the tremendous overhead that Apple requires to operate and continue to innovate. But Apple has the advantage of economies of scale, and NuTek still has its own research to finish. After all, a Mac clone should be compatible with Microsoft Excel, which, along with HyperCard 2.1 and Aldus FreeHand 3.1, the NuTek work-alike cannot presently run.

Meeting Demand

DESPITE THESE DIFFICULTIES, NUTeK may not have to compete on price alone. Its board and system software will let value-added resellers offer a complete, ready-to-use system specifically configured for vertical markets. More important, there is room in the market for more than one Mac vendor. Over the last year or so, many would-be buyers have discovered that the Macintosh they wanted wasn't always available. Demand has been at its highest ever, Apple has had difficulty delivering parts to its factories on time, and there have been instances of bug-related shortages. Past shortages of the Mac IIfx, the PowerBook 180, and the Quadra 900 and 950 spring to mind.

So, should Apple view clone makers as foes, or could they be possible friends? Apple's market-share strategy indicates the importance of expanding the installed base of Macintoshes in a personal computer galaxy dominated—in quantity if

not quality—by Microsoft operating systems. Apple has done a tremendous job of fueling demand by fielding an excellent collection of new products at compelling prices. Apple must now meet that demand. A good clone might actually ease the strain on Apple's manufacturing and support. It's true that Apple would not directly harvest as much profit, but Apple would benefit from having a higher number of Mac-like systems out there because that would attract software developers to its bandwagon.

continues



*When
will Apple
license
a clone?*

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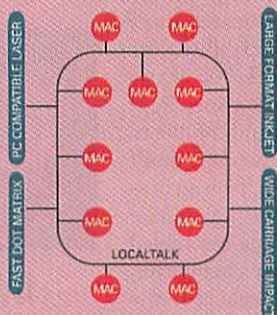
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License to Clone

IF APPLE DECIDED TO MAKE MONEY from clones, it could be more liberal about licensing its operating system. Licensing the current Mac OS would also let Apple control the relative positioning of clones made by licensees, depending on how Apple crafted the licenses. For example, Apple could license the operating system to a company that would make and sell a machine equivalent to the Classic II or the LC II at an exceptionally low price. Neither machine directly competes with the more compelling Color Classic or LC III, both of which can command a higher price due to their superior features. Apple could free up manufacturing capacity, boost the installed base of the Mac, and make some money on the licenses. Because Apple is a vendor of hardware and systems software, it could continue to innovate with its own products. And because Apple can always say "We control the hardware, we control the software, do not attempt to adjust your set," the company could control even licensed clones by making them obsolete with new Macs.

Apple's recent announcement of Macintosh Application Services for the PowerOpen Environment created by Apple, IBM, and others, shows a commitment to license the Mac OS in the future. This software will let PowerOpen hardware systems run System 7 and its applications. The PowerOpen Environment combines the PowerPC RISC-based hardware architecture with an underlying version of Unix. Since Apple appears ready to migrate the Mac OS to the more powerful PowerPC hardware, why not let companies license the current operating system in the meantime? Precisely because Apple is sometimes "production-constrained," which means that every sale of a clone could be a sale lost for Apple. Unless Apple decides to go for vastly larger market share—which it should—there's little motivation in the short term to license the current system.

In any case, NuTek doesn't offer a short-term threat to Apple. Even if it did, Apple could solve the problem by licensing its operating system, or dropping prices, or hiring a lot of lawyers to all say "Boo" at the same time. Longer-term, Apple must consider the economic ramifications of how its intellectual property is staked out. The bottom line is that clones in some form are certainly coming, but NuTek, as presently constituted, has a tough struggle ahead. Many PC companies have bitten the price-war dust, and the territory under Apple's prices should be dry indeed for a small outfit like NuTek. So far, it seems that Nutek is a year late and a compatibility short. ■

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IT DOESN'T TAKE A ROCKET SCIENTIST TO FIGURE OUT WHICH 24-BIT COLOR GRAPHICS CARDS ARE THE FASTEST.

MacWEEK

BENCHMARKS

Reprinted from January 12, 1992

Hydra composite tests

(Results in ticks; lower is better)

■ RasterOps 24XLI

■ SuperMac Thunder/24

Unaccelerated 24-bit mode



Accelerated 24-bit mode



Accelerated 8-bit mode



All tests were run on a Mac IIx under System 7.0.1 with 20 Mbytes of RAM and with 32-bit addressing on. Hydra times are in ticks (1/60th of a second).

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Reprinted from MACWORLD February 1993



Gauging Video Speed

Products are ranked in overall performance order, from fastest to slowest, within each monitor size category. The best in each category is indicated in red.

With 19-inch monitors:
SuperMac Thunder/24
SuperMac Spectrum/24 PDQ Plus
SuperMac Spectrum/24 Series III
Radius PrecisionColor 24X
RasterOps 24XLI
Radius PrecisionColor 24K

With \$499 piggyback board installed

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REAL WORLD TESTS

In our real-world tests, the size of the monitor dramatically affects performance for line scrolls; bigger monitors are slower. However, bigger monitors can have an advantage for page scrolls, where all the data on the new page is moved onto the screen in one step. Scrolls are good tests of actual performance because they are common tasks and because they cause the Mac to redraw a range of objects, from text to graphics.

Vertical Scroll

(in seconds)

Average results for a series of up and down scrolls (one line at a time) in Excel and Word documents.



Shorter bars are better.

Horizontal Scroll

(in seconds)

Average results for a series of left and right scrolls (one column at a time) in Excel documents.



Shorter bars are better.

Page Scroll

(in seconds)

Average results for a series of up and down scrolls (one screen at a time) in Word documents.



Shorter bars are better.

LOW LEVEL QUICKDRAW TESTS

Low-level tests of QuickDraw command processing show theoretical best performance. The Basic Commands group includes QuickDraw commands that all vendors accelerate. Radius and SuperMac accelerate some other commands, but our tests show that this does not change these boards' performance.

All Commands

(Speed compared to Apple II+24)

Relative performance in processing all 118 QuickDraw commands, using the industry-standard Hydra benchmark.



Longer bars are better.

Basic Commands

(Speed compared to Apple II+24)

Relative performance in processing 25 common QuickDraw commands, using the industry-standard Hydra benchmark.



Longer bars are better.

MacUser

Figure 1: Speed Results

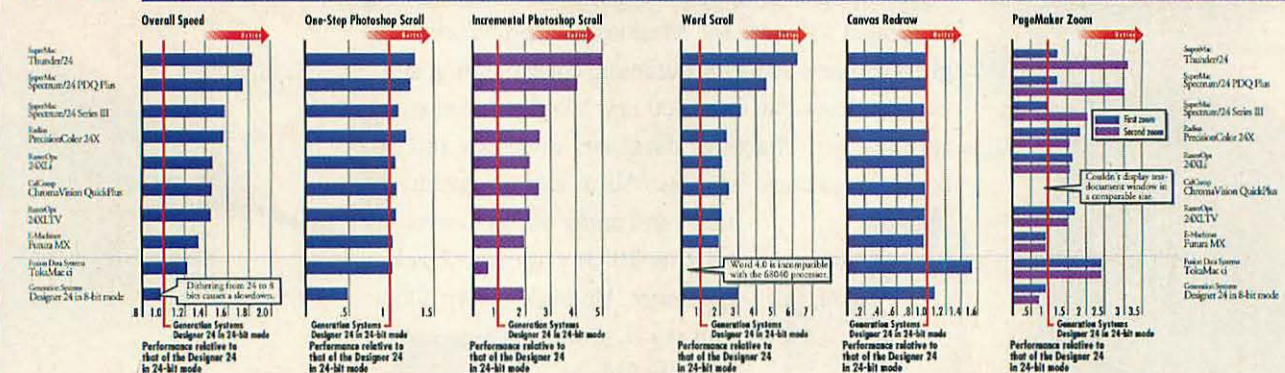


Figure 1: To find out if an accelerated video card can improve the performance of some popular applications, we performed a series of real-world tests. We ran all tests on the same Mac IIx connected to the same monitor. We compared the results with those of a Generation Systems Designer 24 unaccelerated video card in 24-bit mode. We also subjected the Designer 24 to the same tests in 8-bit mode and repeated the tests with a Future Data Systems TekMac II to see the effect of CPU acceleration.

Overall Speed: The SuperMac Thunder/24 and Spectrum/24 PDQ Plus were fastest overall, almost doubling the speed of the Designer 24 unaccelerated video card in 24-bit mode.

One-Step Photoshop Scroll: Many users of 24-bit color frequently use Photoshop, so we scrolled through some 24-bit Photoshop images to see if the accelerated video cards could beat our control product. The Thunder/24 was 25 percent faster than the unaccelerated video card, and the TekMac II CPU accelerator offered no improvement at all.

Incremental Photoshop Scroll: In the incremental scroll, SuperMac's Thunder/24 was five times as fast as the unaccelerated video card. The TekMac II was exactly 40 percent slower.

Word Scroll: To see if Word users stood to gain anything from video acceleration, we scrolled through a two-page text document and found that the SuperMac Thunder/24 was more than six times as fast as the Designer 24. The SuperMac Spectrum/24 PDQ Plus came in a close second, and all the other cards were about twice as fast as the unaccelerated card. At 24-bit color, we saw a waste for Word users, we ran the same test on the Designer 24 in 8-bit mode and found that it was nearly three times as fast as in 24-bit mode, beating the majority of the accelerated 24-bit cards. We could not run the test with the TekMac II, because Word 4.0 is incompatible with the TekMac II's 68040 processor.

Canvas Redraw: We were surprised to find that the accelerated video cards did nothing to speed up a Canvas redraw. The one product that really helped in this task was the TekMac II, proving that this task was primarily a computer-intensive one, a task for which video accelerators are not well suited.

PageMaker Zoom: Finally, we zoomed out to a 100-percent view from a 400-percent view of a PageMaker document consisting of text and a 24-bit color image. We then repeated the same test to see if the cards were making any of the video data. All the accelerated video cards, with the exception of the Radius PrecisionColor 24X and the two RasterOps cards, performed the second zoom much faster than they did the first. The Designer 24 card was slower in 8-bit mode than it was in 24-bit mode because the 24-bit graphic had to be deinterlaced for the 8-bit display.

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The Hydra QuickDraw™ performance test has become the standard for evaluating the speed of 24-bit color graphics cards. As you can see, Thunder/24™, Spectrum/24 PDQ™ Plus, and Spectrum/24™ Series III outperform all the other 24-bit color graphics cards on the market.

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Circle 330 on reader service card

Letters

JUNE 1993

Early Returns on April Macs

THE COLOR CLASSIC—IT'S APRIL Fools', right? After all, only a fool would design a Classic that resembles 1950s science fiction kitsch ("Color Classic," April 1993). And only a fool would purchase such a mutant when for only a few hundred bucks more he could get an LC II or III. The real Classic line ended with the Classic II.

*James Conner
Kalispell, Montana*

IN RESPONSE TO YOUR CRITICISM OF the Color Classic's small screen, I have to say: You don't get it.

The first Macintosh revolutionized graphic design despite its small screen and high price. Critics complained. People bought. Now, a color Classic with a larger screen than ever before—wow, what a country! Apple gets it. Do you?

*Kevin Whaley
San Diego, California*

GALEN GRUMAN DOESN'T SEEM sure of what type of user the new Centris targets. I think Apple is looking East, especially to Japanese offices, whose operating environment, KanjiTalk, typically does not require expansion boards or an FPU, but does require a powerful CPU.

The Centris 610 will be a big hit in the Japanese market if Apple makes its price competitive not only with the PC compatibles but also with the NEC PC9800 series, the longtime champ in the Japanese market.

*Ted Yoshimura
Sunnyvale, California*

Gotcha!

THREE WEEKS AGO, I PURCHASED A Mac IIVx. Today, I read your April issue only to find out that significant information had been lacking in your De-

cember issue about Apple's new product marketing and pricing strategy. The lack of this information cost me somewhere between \$1100 and \$1600. I find it hard to believe that you did not have some inkling of the substantial changes that were about to occur in terms of new products and lower prices.

*Gordon Kuster
Orange, Connecticut*

I BOUGHT A MAC IIVX AND IN LESS than 90 days its price dropped over \$1000, and its performance was matched by the LC III. Now, for the privilege of upgrading to the new Centris, I could give Apple another \$1000. Apple has another unhappy customer.

*Ron Davis
Abilene, Texas*

THE MAC IIVX HAS BEEN RENDERED obsolete only four months after its introduction. I happen to be one of the suckers that Apple duped into buying one of these instant relics. I'm so glad I could be part of Apple's prototype testing program. Hey, where's my paycheck for services rendered?

I can hear Apple's response already, "But sir, upgrades happen all the time in the fast-paced computer world. And you can always upgrade your IIVx." Let's say I spend the \$1199 to upgrade to a Centris 650. My \$500+ RAM investment is suddenly in the toilet, also. So, adding the price of my original machine (bought only months ago) brings me to a grand total of \$5000 for a computer now selling for \$3400.

*Sean Ogarrio
San Jose, California*

FOR THOSE OF US WHO CARTED home a IIVx, the introduction of the Centris line was like watching a magician hand back the wallet we did not know was missing. Apple could set things right by offering a reasonable upgrade to the 040 for those of us who jumped early, but in-

continues

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Centris 610's 040 power is a real winner



I. Cruise, Reporter

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The Centris 610 is worth shouting about! Its superior performance, speed and low cost you can finish your work in less time and spend more time relaxing.



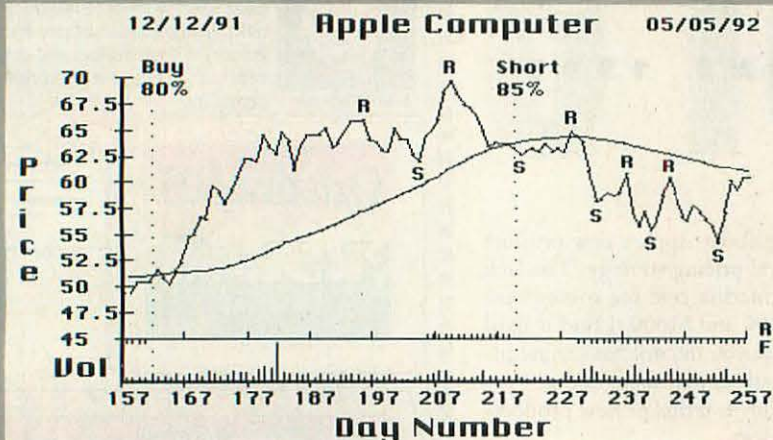
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Future results may vary.

All programs not available on all computers.

Circle 25 on reader service card

In the March review of the Duo Dock, we incorrectly stated that the Duo Dock supports the SCSI disk mode. Only the MiniDock allows you to use a Duo as a SCSI drive. Also, the Duo Dock review stated that you can add extra memory to the Duo Dock. Only video memory may be added to the Duo Dock.

The March feature "First-Time Authoring" stated that, for MovieWorks from Interactive Solutions, "You still need other software and hardware if you intend to create your own QuickTime movies." The sentence should have read, "You still need other software and hardware if you intend to capture and edit your own video."

The correct phone number for APS is 816/478-8300 ("Internal PowerBook Modem Prices Plunge," News, March 1993).

MacSchedule F by MacEssentials was incorrectly listed as MacSchedule in the March New Products section.

The correct fax number for Useful Software Corp. is 508/922-0413 (New Products, March 1993).

The correct number for the Macacademy bulletin board system is 415/621-0567 (Conspicuous Consumer, March 1993).

In "Quadra 800" (April 1993) the maximum memory for the Quadra 950 should have been 256MB, not 16MB.

In the cutaway diagram of the Centris 610 the NuBus board should have been oriented from back to front instead of from side to side ("Centris 610 and 650," April 1993). Also, the "Who Offers 7-Inch Boards?" sidebar should have included Asante's MacCon3 for NuBus, MacCon+III, and MacCon+IIET boards. Finally, Cabletron's E6110, E6112, and E6119 NuBus boards fit into the 7-inch space, while the E6020 does not.

The correct phone number for VIDI is 818/918-8834 ("VIDI's New Presenter," News, April 1993).

stead we can pay 133 percent of the price of a new Centris to make our brand new IIVx what it should have been to start with.

It was especially gratifying to hear that Apple's first-quarter revenues were at an all-time high.

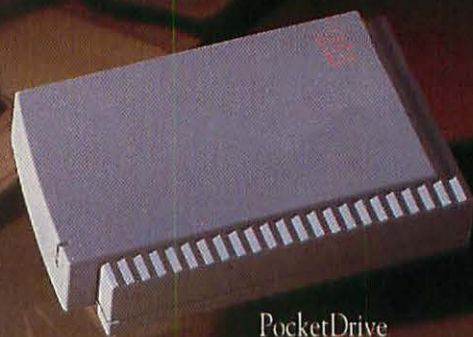
Patrick Ryan
Farmer City, Illinois

continues

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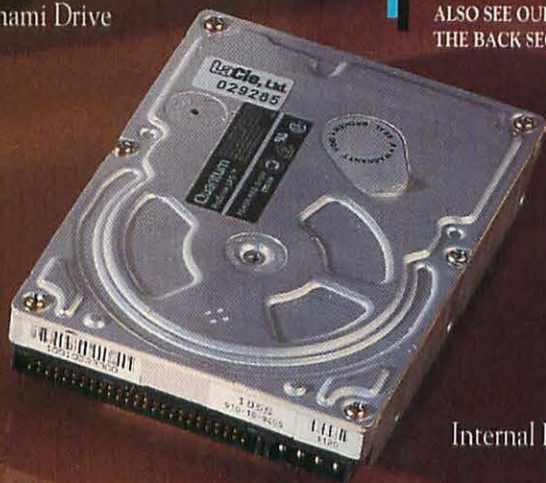
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Circle 243 on reader service card

RECENTLY PURCHASED A IISI, BUT with the new Centris 610 on the market, what are my chances for a reasonably priced upgrade?

Bryon Henderson
Wilmington, Delaware

(a) Slim; (b) none.—Ed.

EARN FROM THOSE OF US WHO INNOCENTLY bought the dreaded Mac IIvx, only to have its value drop three months later when Apple belatedly introduced the real midlevel computers. Don't ever buy an Apple product for at least six months after introduction. Wait to see what marketing scheme they have in mind.

Joseph Compton
Encino, California

Productivity Still Missing

AGREE WITH STEVEN LEVY (*THE Iconoclast*, March 1993). You may have fun putting QuickTime clips in your word processing file, but you're not the vanguard of a productive new generation.

Tom Seibold
Berrien Springs, Michigan

MUST SAY THAT I AM MORE PRODUCTIVE now than when I worked on my typewriter. But I still wonder: am I more productive due to the hardware or due to the need to pay for everything?

P.S. I want to upgrade my RAM. Do you need another free-lance writer?

Michael LaBossier
Columbus, Ohio

Are you kidding? We can hardly do enough work to pay for our own stuff.—Ed.

IF COMPUTERS DIDN'T SAVE US COMMERCIAL graphic artists time and our clients money, we'd have known it long before Dr. Loveman and we would have discarded them early on.

Bruce Bittle
Eugene, Oregon

DURING THE PERIOD THAT DR. Loveman studied (the late 1970s through mid 1980s), about 90 percent of the microcomputers installed in U.S. business sites were DOS-based. Could it be that "C:> Bad command or file name" are important clues in The Case of Purloined Productivity?

Irv Wiswall
McMinnville, Oregon

Quite possibly. If the following, from a recent issue of *Imaging*, can be believed, we've got the culprit for the 1990s, as well. "*Imaging Magazine* testdrives many Windows applications. After we've testdriven them, we'd like to remove them . . . It's hard, if not impossible, since setup (or install) files are compressed and Windows itself makes changes to files you don't know about. Does anybody have a program—or a simple way—of removing files?"—Ed.

Mail-Order Manifesto

WORK NIGHTS AS A PHONE-ORDER representative for a large Mac mail-order company. *Macworld* regularly offers tips for mail-order shoppers. I would like to offer the following suggestions from someone on the other end of the telephone.

Remember that you're speaking to a human. Don't bark commands, product names, or stock numbers. When the waiter arrives to take your order, do you shout "Steak!"?

Don't call in from the road. How do I know? You usually tell me several times, and the road noise makes it hard to hear you. You struggle to retrieve a credit card from your wallet while keeping a hand on the wheel (and, I hope, an eye on the

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road). Let's hope those other drivers imagine you're wrangling crucial business deals out of cranky clients, not arranging to have Leisure Suit Larry delivered to your office via overnight express.

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Don't put me on hold. My pet peeve—I'm expected to make my subsequent calls hold while you take care of other business.

We are thinking, feeling humans. We don't deserve your tantrums and rages.

Name and address withheld by request

Finding an Online Home

IN RESPONSE TO "EXPLORING THE Online World" (*Conspicuous Consumer*, March 1993): Recent experience with Prodigy suggests that one important criterion in selecting an online service is the company's philosophy. All I wanted to do

was converse with other members in a language other than English. Notes posted in other languages were returned, as well as notes posted to the French subject heading under the Hobbies bulletin board. French movies must be discussed in the Arts BB; French brie and burgundy, in the Food and Wine BB; and so on. Repeated messages to Prodigy membership services were met with form letters.

Sometimes the reactions reached ridiculous proportions. A note I posted asking for information about a kind of slipper (seen in a French movie) that cleans as you walk was returned as off the subject, but not before I received a reply. I wrote to thank the member who enlightened me, saying that the slippers would be useful in my house, where there is a whole warren of dust bunnies. This note was returned to me with a message from Prodigy stating that my note was not compatible with the family orientation of their service.

Maybe I got the wrong form letter, but I certainly got the message: "Your type is not welcome here." I disconnected—permanently—and signed on where I'm wanted.

*Jonathan Bailey
Columbus, Ohio*

It's in the Stars

WHILE I FIND THE STAR-RATING system to be very helpful, I'm having a slight problem with what I perceive as inconsistencies.

For a case in point, I offer PowerPoint 3.0 and MacGlobe 1.3 reviews in the February 1993 issue. I have no experience with either product (or any competitors), so I do not think I have any inherent bias one way or the other. The PowerPoint review seems negative, while the MacGlobe review seems positive. But in both cases, the stars don't back up the copy. PowerPoint received four stars; MacGlobe, three.

The reviews are invaluable, but those stars carry a lot of psychological weight.

*E. Garry Hill
Mountain View, California*

It is difficult to distill a one-word evaluation from a review and to maintain consistency among the authors. *Macworld's* reviewers consider nine factors—design, interface, ease of use, performance, reliability, value, documentation, support, and innovation—when assigning a star rating. A three-star product is considered a good product, while a four-star product is considered very good, and the *continues*

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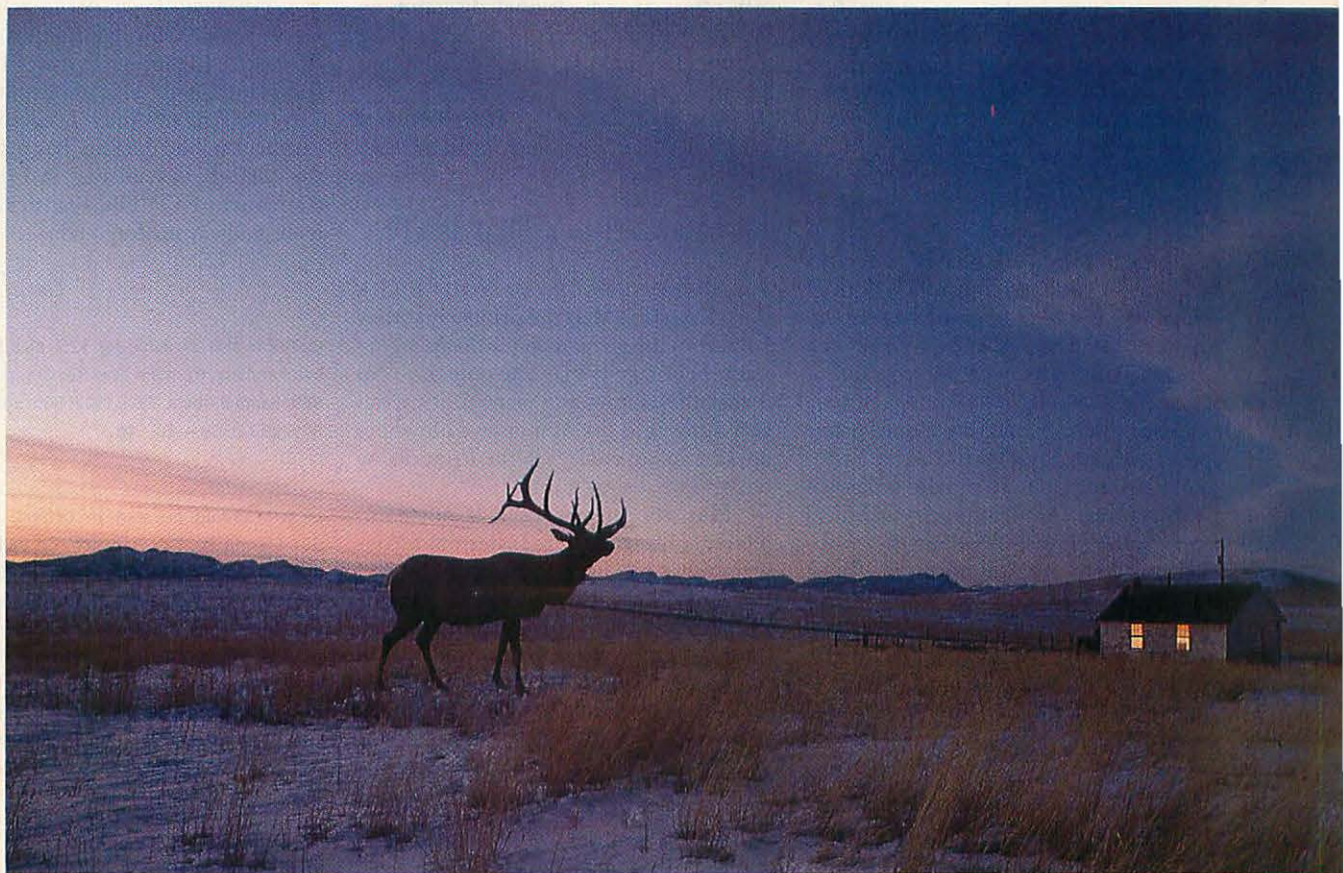
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rare five-star product is outstanding. The range of products and the reviewers' different writing styles may account for the variations you perceive. They are not a result of different standards. We will, however, take your comments to heart and try even harder in the future to provide consistent star ratings.—Ed.

Microsoft Words

BOY, IS THAT MICROSOFT WORD 5.1 (*Reviews*, March 1993) a dog! When you install 5.1 on a PowerBook, a battery indicator extends your screen 1 inch to the right, whether you like it or not.

Also, there is no envelope paper option for the StyleWriter, that little-known printer from a virtually unknown manufacturer. According to technical support, they know all about the problem and have no intention of fixing it until the next version, which I can purchase for a mere. . . . But, hey, they pointed out that at least some of the enhancements work. Thank you, Microsoft, for selling me a product that is only partially defective.

Peter English
Austin, Texas

ON A RECENT VISIT TO MY UNIVERSITY bookstore, I found that Microsoft offers an educational discount on Word 5.1. Price: \$85, as opposed to \$129, to upgrade. Am I glad that I failed to upgrade or what?

Richard Mendell
via America Online

The Mac Printer That Isn't?

HEWLETT-PACKARD TOUTS THE LaserJet 4M as the printer that they built from the ground up for the Mac (*Reviews*, February 1993). The only problem is that they forgot the manual: it carries very little info for Mac users. Nowhere does it explain choices in the Print dialog box and what they mean.

Plus, the printer itself is not completely software driven. Instead of recognizing that you have chosen Envelope in the Page Setup dialog box and Multi-Purpose tray in the Print dialog box, you must walk over to the printer and punch in changes if you want to do something like print an envelope from the multi-purpose tray.

Norm Rechtman
via America Online

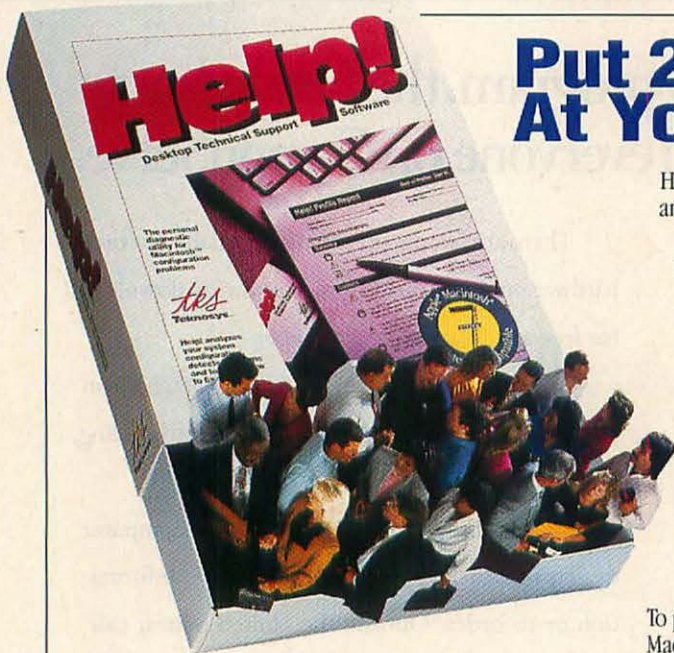
Tex/LaTex

IN THE *NEWS* SECTION OF YOUR APRIL 1993 issue, you reported on Blue Sky Research's Lightning Textures 1.5, saying that it is the only Mac implementation of Tex. OzTex, by Andy Treverrow, is an excellent public domain Tex program for the Mac. It is available on Internet via anonymous FTP (File Transfer Protocol) from midway.uchicago.edu.

J. B. Thoo
Davis, California

OzTex is also available for \$25, plus \$3 shipping and handling, from the Tex User Group at P.O. Box 869, Santa Barbara, CA 93102; 805/963-1338, fax 805/963-8358.—Ed. **m**

Letters should be sent to *Letters*, *Macworld*, 501 Second St., San Francisco, CA 94107; via fax, 415/442-0766; or electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), or AppleLink (Macworld1), or via Internet (70370.702@compuserve.com). Include return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld*.



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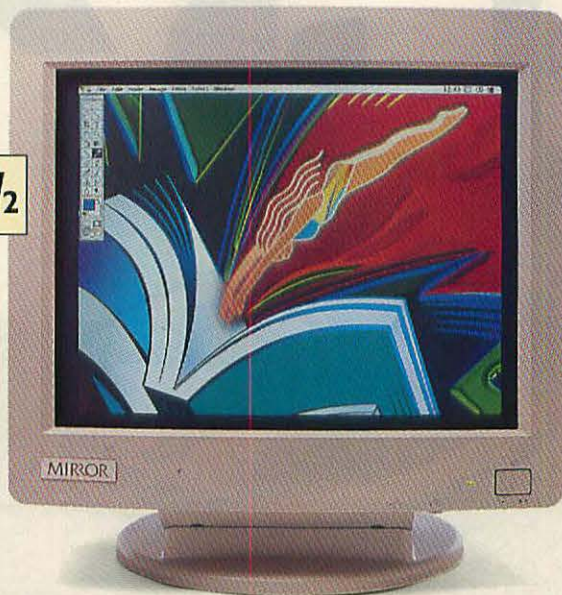
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David Does QuickTime

BY STEVEN LEVY

DAVID HERSCHMAN DIDN'T set out to be a pornographer. It just kind of happened. He and his partner, Hikaru Phillips, were once computer guys, not sleaze merchants. They both were excited by a market on the verge of exploding: multimedia. But established companies—corporations like Voyager, Brøderbund, Microsoft, and even Time Warner—seemed to have the major bases already covered. Those bigfoots were heavily into multimedia games, education, productivity, and research sources. Was there anything left that a couple of hardworking entrepreneurs could get into without a giant bankroll, and make a profit fairly quickly? What would sell?

Something that always seems to sell. Sex.

"The market is there for it *now*," explains Herschman. How did he know? "Independent research," he says, though he does not elaborate on his scientific methods. Apparently, the results of his soundings led him and Phillips to the somewhat Faustian decision to form Intererotica, a company devoted to "interactive adult entertainment."

A question left hanging by his research project, apparently, was the precise degree of (what I shall charitably refer to as) eroticism that would be provided by his company's initial multimedia effort. He first considered a relatively tame version of strip poker. Applying the motion picture rating assignments to such a project, this would be a clear R. But the project did not materialize.

Oddly, Herschman assigns a supporting credit to *Macworld* for nudging him in this direction. This magazine and others that also survive on advertising revenue from those selling wares to Macintosh users let it be known that they would not welcome advertising for a product featuring images of naked human beings, with the possible exception of familiar reproductions of paintings from the Italian Renaissance. If ads for an R-rated product were to be refused, Herschman and his partner asked themselves what they could lose by doing an X-rated product. "We decided to go all the way," he says.

Even though, as Herschman explains,

"we weren't from the adult world," he and his partner dipped into the demimonde and produced a shoot that was quite firmly centered in the so-called adult world. The result was *Night Watch*, a disk where the viewer embarks on a voyeuristic journey through the units of a fictional condominium, supposedly with the aid of a hidden camera provided by a stripteasing security guard. Herschman considers it a reasonable first effort. He seems quite proud of certain aspects of the CD ROM product, which sells for \$80.

"It's one of the first all-digital productions," he boasts. "We edited it digitally using Adobe Premiere. All the sets, though not of course the actors, were rendered in 3-D, as you probably noticed."

To be honest, I did not notice. The striking aspect of *Night Watch* is not the 3-D rendering but the nature of the product itself. Though Herschman rates it an X, I would have to triple that designation. The activities depicted by the actors hired to make the QuickTime clips in *Night Watch*—though it is difficult to discern the difference in these things between depicting actions or performing them—are those most often performed in the privacy of a bedroom or bordello, and rarely on a modular Macintosh. The camera does not flinch, even when the most rudimentary application of discretion, or aesthetics, cries out for it. The genre forbids flinching. The genre, of course, is hard-core pornography, which has, inevitably, met multimedia.

It is a marriage made not in heaven, but on 42nd Street. And it is selling very well.

Exxxpo

AT THE JANUARY Macworld Expo, *Night Watch* and more than a dozen other products were on display at a booth rented to a distributor called Body Cello. To David Herschman's satisfaction, he sold 400 copies of *Night Watch*. Don't bother pulling up the Calculator DA—I'll do the math for you. Four hundred copies at 80 simoles each is \$32,000. In four days.

Body Cello was not alone. In another booth, budding

multimedia magnate Joshua D. Gordon was selling a disc called *Digital Dancing*. This was no arithmetic program. The dancing was done not by digits but by strippers recruited by Gordon. "My background is databases," says Gordon. Like Herschman, he explains, "I was looking for a way to play with multimedia, QuickTime, and the CD ROM technology, and since there are very few things that move people like sex or eroticism, I was pretty sure I could recoup my money." He did.

In addition, a company called Pixis was offering a disk called *Adventures of Buttman*, which was essentially a QuickTime rendering of a sleazy triple-X flick. (The principals of Pixis were insufficiently proud of their activities to provide me with their names.) Finally, Mike Saenz, the fellow who may lay claim to *Virtual Valerie*, the first of these adult products, was hyping a sequel—though purists in these matters may complain that *Valerie*, by virtue of being a comic-book rendering of a sexual object and not a video or photo image of a real-life sexual object, does not qualify as a pornographic icon.

A few Expo-goers complained. Mitch Hallal, the president of Mitch Hall Productions, which produces the Expo, emphasizes that the protests were minimal. However, he concedes that inadequate measures were taken to shield passersby from the emphatically intimate activities occurring in full-color RGB display. In

the future, he promises, he will require vendors of such products to have enclosed booths, where only those wishing to see unadorned body parts in action will see them. He will also demand guards be posted at the entrances to those booths, to ensure that curious children won't find their way in. Though some in the Mac community prefer that the companies selling sex be banned from the show, Hallal says that he doesn't want to get into censorship in any form.

The Q-Word

I SHARE HALLAL'S AVERSION to censorship. So instead of

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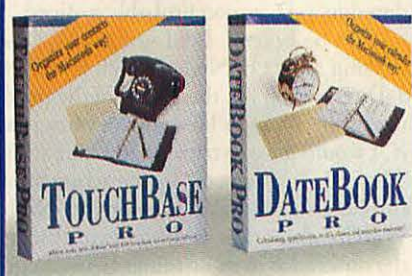
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- 1594 Fair Witness 1.2 185.
- ★ **Claris ... 30 day MBG**
- 3903 ClarisWorks 2.0. 199. 11472 Upgrade 99.
- 3836 FileMaker Pro 2.0 268. 4752 Upgrade. 89.
- 1745 MacProject Pro.. 399. 3531 Resolve 169.
- 11202 MacWrite Pro 169. 11475 Upgrade 69.
- Contact Software**
- 7636 ACTI 249. 10317 ACTI Comp. Upgrd. 91.
- ★ **Dow Jones ... 30 day MBG**
- 1942 Market Analyzer Plus 2.04 225.
- ★ **Helix Technologies ... 30 day MBG**
- 1077 Helix Express 299.
- ★ **Inspiration Software ... 30 day MBG**
- 11269 Inspiration 4.0 159.
- ★ **Intuit ... 30 day MBG**
- 2507 Quicken 3.0 42.
- ★ **Lotus Development ... 60 day MBG**
- 11580 Special: 1-2-3 Mac & DeltaGraph Pro Bundle (not available to resellers) 149.
- ★ **MECA ... 60 day MBG**
- 2796 Managing Your Money 5.0 32.
- ★ **Microlytics ... 60 day MBG**
- 7820 Random House Encyclopedia 1.0 68.



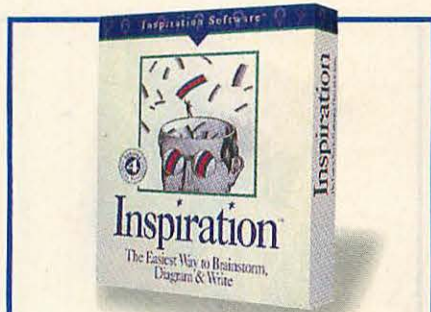
- ★ **Lotus/DeltaPoint ... 60 day MBG**
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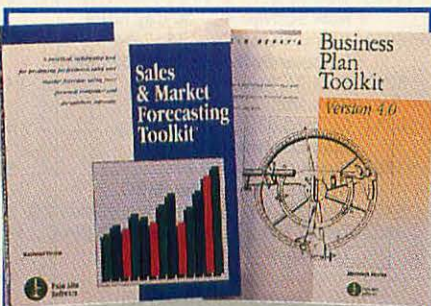
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11189 Nisus Limited Flag Edition 3.4 239.
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2981 WillMaker 4.0 35. 1204 Living Trust 43.
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11199 Sales & Market Forecasting Toolkit 75.
★ **Pastel Development ... 30 day MBG**
1785 DayMaker 2.0 79.
★ **Peachtree ... 60 day MBG**
9584 Acct. for Mac 119. 9588 Insight Acct. 299.

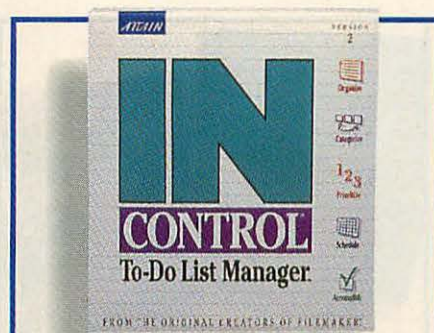


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Round Lake Publishing
LetterWorks, SALES or LEGAL..... ea. 45.
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10797 JMP 2.0 and DeltaGraph Pro Bundle .. 599.
10796 JMP Design 259.
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10832 Informed Foundation 299.
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1701 LapTrack.. 52. 2986 Timeslips III .. 194.
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5886 FastLabel.. 55. 3235 MacLabelPak.. 85.
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10773 WordPerfect Works 1.2 149.
★ **Wordstar ... 30 day MBG**
6984 Correct Grammar 3.01 49.
10277 The Correct Bundle (4 programs)..... 99.

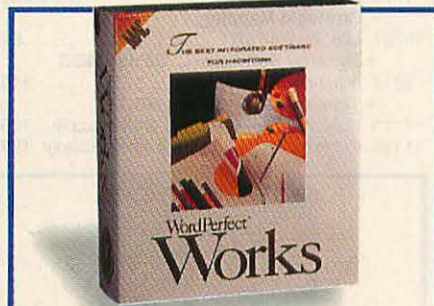
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6053 Plus Pack 2.0 118. 6098 TypeAlign 61.
4145 Adobe Premiere 429. 3199 Upgrade.. 149.
8171 Adobe Illustrator 3.2 (w/Dimensions) .. 368.
6644 Photoshop 548.
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7971 AgfaType CD-ROM 69.
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3506 SuperPaint 135. 4751 Persuasion 325.
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★ **Ares Software ... 30 day MBG**
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Broderbund Software
3572 Kid Pix 1.2.. 34. 7293 Companion..... 23.



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2518 MacDraw Pro 275. 8007 Claris CAD 599.
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11203 Brushstrokes 95. 11473 Comp. Upgrd. 75.
★ **DeltaPoint ... 60 day MBG**
11580 Special: Lotus 1-2-3 Mac & DeltaGraph Pro Bundle (not available to resellers)..... 149.
★ **Deneba Software ... 30 day MBG**
11055 artWORKS 99. 3227 Canvas 3.0.4 259.
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Fractal Design
1068 Sketcher 1.0 93.
10402 Painter 2.0 265.
Gryphon
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7651 Action! Mac 349. 7441 SwivelPro... 479.
3450 SwivelMan. 596. 7653 MacroModel 999.
★ **Manhattan Graphics ... 30 day MBG**
4990 Ready, Set, Go! 6.0 (May '93)..... 219.
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2565 Project 3.0..... 445. Upgrades..... call
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Quark
7612 QuarkXPress 3.1..... 549.
Queue, Inc.
11185 Toucan Press..... 49.
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Strategic Mapping
10767 LOCAL EXPERT..... 82.
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6617 KaleidaGraph 3.0..... 149.
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7115 Publish It! Easy w/ Paint-It! limited supply.. 109.
11196 Publish It! Easy & Color-It limited supply 199.



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- ★ **Abbott Systems ... 30 day MBG**
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★ **Alysis Software ... 30 day MBG**
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1074 System 7.1... 79. 3413 MultiPack.... 369.
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2198 More After Dark.. 23. 2196 Bundle.. 39.
3392 Star Trek: The Screen Saver..... 34.
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1593 Drive 7 2.3..... 49.



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10595 Safe & Sound 1.0 37. 5041 MacTools 105.
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7310 TimeLog..... 62. 7309 (10 Pack)..... 399.
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5255 Retrospect 147. 7945 Remote 2.0 264.
★ **DataWatch ... 30 day MBG**
4803 Virex/Mac or 8561 911 Utilities..... 62.
Delta Tao Software
10755 WonderPrint..... 36.
★ **Fifth Generation ... 30 day MBG**
4287 PYROI 4.01 27. 3955 Suitcase 2.1.2. 53.
7404 DiskDoublor 52. 4838 AutoDoublor 58.
10398 CopyDoublor 39. 7704 Public Utilities.. 98.
FWB, Inc.
2999 Hard Disk ToolKit 125. 7929 Personal 49.
★ **Harvard Systems Corp. ... 30 day MBG**
11193 Kai's Powertools for Photoshop 89.



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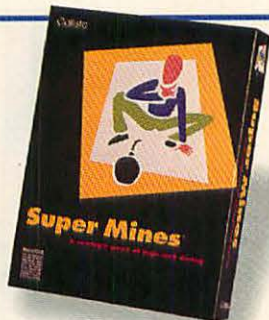
5203 *Help!*—Configuration problem solver improves Mac's efficiency and prevents crashes. Artificial intelligence detects conflicts, incompatibilities, improperly installed files, damaged and duplicated files, etc..... **\$88.**

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10731 PBTools 62. 10976 PBTools Bundle 92.
Insignia Solutions
7552 RapidTrak..... 58.
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10498 FolderBolt/NightWatch II Bundle 129.
★ **Leader Technologies ... 30 day MBG**
10272 PowerMerge 1.0..... 79.
★ **Logical Solutions ... 30 day MBG**
10169 7th Heaven 2.5 67. 11191 Chameleon 39.
★ **MAXA Corporation ... 30 day MBG**
11248 Alert! 115. 10772 Snooper (software) 129.
10771 Snooper 2.0 Hardware & Software Kit 179.
MicroMat Computer Systems
3732 MacEKG II 2.0.6..... 89.
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2020 9 to 5 Office 19. 9767 Reports 2.5 125.
★ **No Hands Software ... 30 day MBG**
11195 Magnet 85. 11194 Common Ground 122.
★ **Now Software ... 30 day MBG**
6925 Now Utilities 4.0.... 84. 8471 (10) ... 775.
★ **Palomar Software ... 30 day MBG**
8210 PLOTTERgeist 2.1 249.
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10594 Offline 3.82..... 62.
Stac Electronics
11568 Stacker for Mac..... 96.
★ **Symantec ... 30 day MBG**
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9957 THINK Ref 2.0.. 89. 2688 THINK C. 199.
Teknosys
5203 Help!..... 88.
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★ **Thought I Could ... 30 day MBG**
4843 Wallpaper 37. 10839 More Wallpaper 25.
UserLand Software
4753 Frontier 2.0..... 185.

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Activision
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1134 Lost Treasures Vol. I 40. 2470 Vol. II 29.
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2517 TRISTAN Pinball 33.
★ **Baseline Publishing ... 30 day MBG**
7785 Talking Moose 4.0.2..... 22.

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9059 Arthur's Teacher Trouble..... 41.
Carmen Sandiego Series (CP)..... ea. 29.
8285 Where/World Carmen Sandiego Deluxe 47.

Buena Vista Software

1711 Heaven and Earth 34.

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11369 *Super Mines* 29.

★ Carina ... 30 day MBG

7761 *Voyager II, the Dynamic Sky Simulator*.. 99.

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5910 *Crossword Creator* 39. 8524 *Casino Master* 45.

Changeling Software

11188 *Pax Imperia* 35.

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2554 *Mouse Yoke (aircraft yoke adapter)* 29.

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Graphic Simulations

8083 *Missions at Leyte Gulf (req. Hellcats)*.... 20.

4756 *Hellcats Over the Pacific 1.0.3* 38.

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3281 *The Writing Center 1.0* 51.

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7126 *Reunion 3.0* 115.

★ Maxis ... 30 day MBG

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11270 *SimLife*.... 39. 11271 *A-Train*..... 39.

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3963 *Oregon Trail 1.1* 28.

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7871 *Berlitz Interpreter*..... 34.

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8257 *Preschool Pak* 34. 7470 *Jungle Quest* 30.

★ Penton Overseas ... 30 day MBG

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Germ., Ital., Rus., Japan., & Heb.)... ea. 35.

VocabuLearn/ce Level III (Span., Fren.,

Germ., Ital., Rus., & Japan.)..... ea. 35.

Pluma, Inc.

8695 *Capitalist Pig* 34.

Psychosis

11562 *Lemmings*..... 35.

Quantum Leap Tech.

11457 *Aesopolis*..... 49.

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9743 *Typing Tutor V*..... 29.

Sierra On-Line

11098 *Crosswords*... 20. 7396 *Red Baron*.. 39.

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★ Spectrum Holobyte ... 30 day MBG

3464 *Tetris*..... 22. 3017 *Wordtris 1.0*.. 28.

4835 *Super Tetris* 28. 9113 *Falcon Color*. 39.

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3287 *Warlords (empires at war)*..... 34.

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★ Toyogo ... 30 day MBG

7624 *NEMESIS Go Master* 35. 7623 *Deluxe* 99.

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11538 *Spectre Supreme* 40. 11537 *LAN 2-Pak* 52.



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11008 *Desert Storm* 27. 11007 *Word Tales* 39.

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7007 *Voice Record* 56. 2034 *Voice Impact* 79.

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8188 *MusicProse 2.1* 189. 5604 *Finale* 549.

Envivio

4106 *Quick-16* 399.

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5486 *Sound Edit PRO*.. 199. 7651 *Action!*.. 349.

4598 *MacRecorder Sound System PRO*..... 239.

5087 *MacroMind Director* 799. 2246 *3-D* 999.

NEC

4252 *MultiSync 3FGx* 689.



Articulate Systems, Inc.

Voice Navigator SW—Voice Recognition Software for all sound capable Macs..... \$319.
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7870 *Rocket 33* 2199.

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8944 *RasterOps 24STV* 799.
11258 *Editing Aces Suite/Digital Video Solution* 3399.

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Software Toolworks

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10530 14" Multiscan Trinitron Monitor 689.
10529 17" Multiscan Trinitron Monitor 1149.

Sound Source

Star Trek: Original TV Vol. 1 or 2 .. ea. 30.
Star Trek: Next Gener. Vol. 1 or 2 .. ea. 35.

1759 *AudioClips: 2001 A Space Odyssey* 35.
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4122 *VideoSpigot LC 255*. 4164 (for NuBus) 379.
7676 *VideoSpigot Pro or 3691 Pro si* .. ea. 1099.

9074 *Spectrum/24 PDQ+* 1649.
7679 *Spigot & Sound*.. 489. 7678 *Pro*... 1189.



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9067 *ColorLink LC 499*. 9070 *ColorLink DC/T* 529.
10321 *ColorPage T16II* 1349. 9064 *T19II* 2399.
9066 *Futura SX*.. 499. 9065 *Futura MX* .. 835.
9063 *Futura LX*..... 999.
Warner New Media
11028 *Magic Flute* 44. 11026 *The Orchestra* 54.

CD-ROM

Against All Odds

10330 *From Alice To Ocean Book* (w/CD-ROM) 39.

Broderbund

3730 *Just Grandma and Me* 34.

CD Technology

2321 *CD-ROM Caddy*... 11. 2533 (5 Pack). 49.

4084 *America Alive!* 75. 8057 *Porta Drive* 619.

Creative Multimedia Corp.

11001 *The Complete Works* 19. 11004 *Audubon* 45.

11003 *Family Doctor HyperCard Version*..... 45.

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1343 *Manhole*..... 23.

2717 *Cosmic Osmo 1.1* 37.

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7313 *SOUND Series Vol. 1* 105.

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6577 *CDR-38 Portable CD-ROM Drive*..... 479.

6582 *CDR-74-1 CD-ROM Drive* 629.

4146 *CD Express* (with CDR-25) 429.

4132 *MultiMedia Gallery* (with CDR-74-1)..... 865.

Peripheral Land, Inc. (PLI)

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11330 *The Journeyman Project* 56.

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11186 *Velveteen Rabbit* 29.

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Wayzata Technology

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8219 *CD Fun House* 25. 10188 *Macnificent 7* 35.

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7101 *AppleTalk Remote Access* 149.

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7872 *Software Bridge/Mac 2.0.1* 99.

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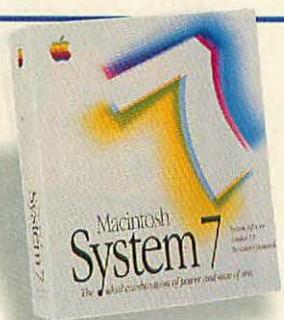
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spending the rest of the column deploring the decline of civilization—it's in the dumper, baby—let me marvel that any of these products are successful at all. It seems to me that of all media through which to consume pornography, Macintosh QuickTime is one of the least amiable. It is my understanding (not, of course, that I would know personally) that those who are attracted to such things do not often pursue their attraction in the office, where one most often finds color

Macintosh computers. I have also been told by worldly acquaintances that a wealth of hard-core products are readily available on VHS at a fraction of the prices charged by those selling CD ROMs with similar images—and that these tapes, unlike QuickTime, offer reasonable resolution and fill up the entire screen of a television set! In addition, it is widely rumored that glossy magazines exist that show extremely revealing photographs—and that these magazines offer a degree of

portability unavailable with Quadras and Macintosh IIfx's.

Even David Herschman readily admits that his disc offers far less quality than do similar products in other media. "It's not here yet," says Herschman. "The screen size is small, the frame rate is inadequate." He is understating the case—the video is fuzzy, it jumps like a jackrabbit, and it's smaller than a dialog box. So why is the stuff selling? "The novelty," he explains. "The innate adventurousness that sexuality is part of." In other words, sex sells.

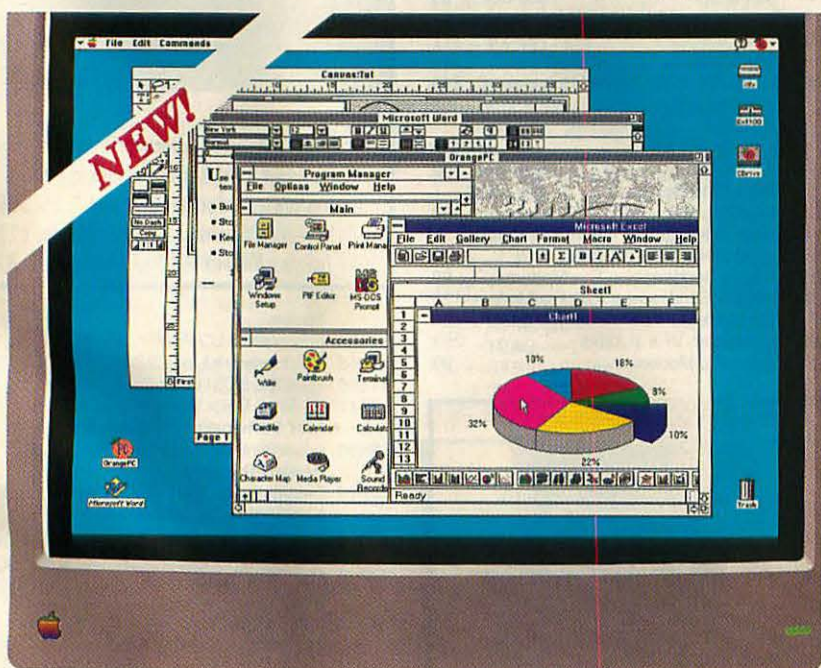
Pet Shop Boys

CAN IT BE THAT THESE PEOPLE ARE truly ahead of the game, and multimedia indeed offers a ripe market for pornography? My conclusion, offered without enthusiasm, is yes. When the multimedia pornographers tell us that the audience exists, they do not exaggerate. Computer users already spend an unbelievable amount of time and money on digital pictures of naked people. One online activist calculated a year's worth of downloads of the sexually oriented GIF and PICT files on CompuServe and estimated that they totaled a whopping \$24 million of connect time. This same audience is apparently predisposed to buy even the crummy multimedia products currently available. It stands to reason that when the technology gets better, and the budgets for the products get bigger, the discs will also appeal to the wider market of pornography consumers. Besides the usual selling points, multimedia offers something new: a sense of interactivity.

By the time you read this, one of those big-budget CD ROMs should be on sale. This is Penthouse Interactive, the first multimedia product officially associated with *Penthouse*, the magazine published by Bob Guccione. It is produced by a company named ICFX, whose principals are James Ehrlich and David Biedny, both of whom have experience in the Mac market. Like David Herschman and Joshua D. Gordon, these two entrepreneurs see sex as a market opportunity.

"We wanted to get in early and define a better way for this genre," says Ehrlich. "A high-end, attractive—romantic, even—aspect. It's not about subjugation of women, it's about the creative aspect, of allowing people to take pictures of beautiful women. We steer away from lasciviousness—we're on a higher plane." (This defense of his creativity was unprovoked by any question I posed to him.)

As Ehrlich describes it, Penthouse Interactive puts the user in the role of a photographer shooting a Pet of the Month



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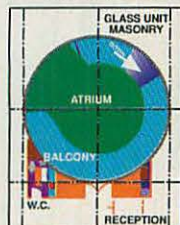
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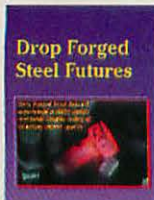
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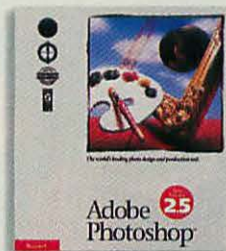
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feature. He (or, quite improbably, she) interviews the prospective candidates—all three of them actual Pets who have modeled for the magazine. After the interview, the Pets get to work. "There are hundreds of different things you can do," says Ehrlich. "The Pets tell you who they are—their dimensions, and so on. You can move them around, put them in all sorts of positions and poses. And you're snapping photos—you send frame numbers to the disc and print them later. When you see your contact sheet with the pictures that *you* took, you feel great." Ehrlich believes that what will sell his product is not so much the nudity, but the interactivity. In this case, the interaction is focused on the illusion that one is ordering around a naked woman. So much for the higher plane.

"We have a whole smorgasbord of plans for interactive titles," says Ehrlich. "As computing power increases, there will be really, really intense stuff."

Pioneer Days

IN A STRANGE WAY, THOSE WHO PREFER more conventional and less degrading uses of multimedia should take comfort in all of this. The appearance of pornogra-

phy quite often indicates that a medium is on the cusp of success. At one time more than half of all sales of videocassettes came from titles you would not show to Aunt Emily. It seems that porno, the intruder we disdain in public and consume voraciously when no one is looking, is the ultimate early adopter. Uninvited, pornography constantly pushes forward in sparsely populated new-media frontiers. It may be seedy, but it is a reliable drawing card. Its audience follows wherever it goes, and in the process this audience learns about the new medium. Eventually that medium becomes successful, and porn, though always profitable, becomes less prominent in the mix of things. It looks as if that progression is under way with multimedia.

Meanwhile, David Herschman rides what he considers the cresting wave of hard-core QuickTime. His company is about to release two new products. One is a so-called adult story dubbed The Interactive Adventures of Seymour Butts. (Mr. Butts is, Herschman explains, a well-known figure in the adult cinema; apparently it was a coup to get him.) The other, called The Dream Machine, is more ambitious. A female narrator offers you a choice of sex scenes; your selections allow

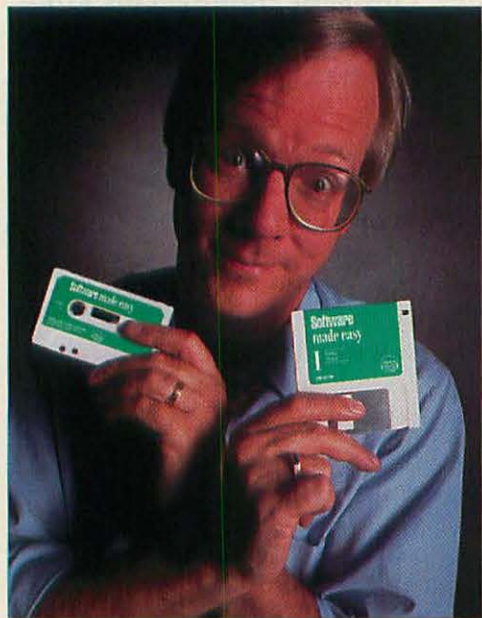
her to guess your ultimate fantasy and presumably provide it for you. "We're going to push the envelope of interactivity," promises Herschman. "I'm really excited."

But David Herschman is not so excited that he wants to pursue his new career path indefinitely. Eventually, he admits, he hopes to move to the mainstream. In fact, he confesses, "I'm concerned about using my real name." He does it, he says, because he and his partner stand by what they've produced. "Unfortunately," he complains, "there's a stigma."

I cannot resist a parting shot. "David," I ask him, "what does your mother think of this?" A sigh comes over the telephone. "My mother had a little bit of a problem," says the reluctant multimedia pornographer. Then his voice perks up a bit. "But my father was OK with it."

I'm no censor, and in any case a discussion of the morality of pornography is beyond the scope of this column. But after seeing Night Watch, I've got to say it: David Herschman, you should have listened to Mom. **m**

STEVEN LEVY's most recent book is *Artificial Life: The Quest for a New Creation* (Pantheon, 1992).



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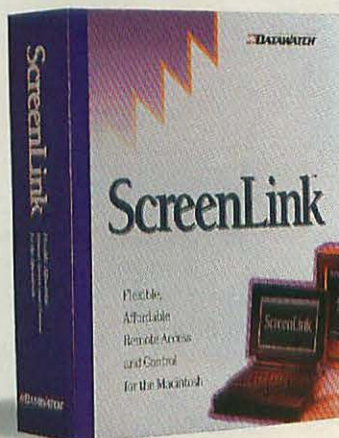
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18 Great Mac Resources

BY DEBORAH BRANSCUM

LOVE WORKING AT MACWORLD in part because of all the nifty stuff that makes it into my mailbox. Once a year I devote a column to resources I've found that aid and abet computing. Some of these items are Mac specific; others are broader, but still interesting. This year's crop ranges from a pamphlet on computer-virus management to a MicroPhone tip sheet to an inexpensive collection of digital practical jokes—which may not aid computing, exactly, but does make it entertaining.

Strictly Macintosh

INSIDE MACINTOSH IS THE CLASSIC series of six books that let programmers and other true techies get into the guts of the Mac. *New Inside Macintosh* (Addison-Wesley) replaces that series with 15 revised and reorganized volumes. An overview is available, along with individual books on files, memory, processes, imaging, text, QuickTime, interapplication communication, and Macintosh Toolbox essentials. Future volumes will cover QuickTime components, operating-system utilities, networking, communications, and devices. The books range in price from \$19.95 to \$34.95 and can be ordered from APDA, Apple Programmer's and Developer's Association, by calling 716/871-6555 or 800/282-2732.

Of course, if your favorite reading matter is *New Inside Macintosh*, you are not a beginner. You are a savvy, swinging, Macintosh super power user. That's not the problem. The problem is the people you deal with—a relative, perhaps; less-experienced users in the office; or a neighbor down the block. They all want you to explain the Mac to them and you don't have the time. Good news—there are two basic books that are just right for beginners. Actually there are many choices—these happen to be my two favorites.

The Little Mac Book (Peachpit Press, 1993), by Robin Williams, is a classic originally published in 1990 and now in its third edition. This slim, \$16 volume covers concepts and jargon, and offers a tutorial at the end. This book is clearly written and elegantly designed; it's a good choice for people who are somewhat familiar with the Macintosh but want to know more.

Macs for Dummies (IDG Books Worldwide, 1992), by *Macworld* contributing editor David Pogue, is published by a sister company to *Macworld*, but I'd plug it no matter where it came from or who wrote it. This very funny tutorial assumes utterly no Mac experience on the part of the reader. It begins by explaining how to turn on a Mac and works its way up to "Faking Your Way Through the Top Ten Programs" and troubleshooting. This is the best possible book for anyone who's afraid to touch a mouse.

The quarterly *Macintosh Product Registry* is a one-volume resource for product listings and contact information. It's \$14.95 on newsstands, or \$40 for a one-year subscription. Software and hardware companies write their own listings, so it's not impartial, but it is useful. Call 407/231-6904 for subscription info.

All Business

THE WEIGAND REPORT: THE WORKING Newsletter For Macintosh Professionals is targeted to small-business folks, including desktop publishers. A recent issue included articles on QuickKeys Extensions, Word 5.0 tips, and useful utilities. I especially like Data Doctor, a nuts-and-bolts column by Steve Burgess about hard drives. An accounting column is in the works. The 8- to 12-page newsletter comes out 6 times per year and even offers online support via the Macintosh Business Forum in American Online. A subscription is \$65 annually; write P.O. Box 690, Cedar Hill, TX 75104, to obtain a sample copy.

Recently I received a letter praising Heizer Software. Christopher Fager wrote to rave about the company's tax templates and other products that "allow me to really take advantage of my nearly ten-year investment in Excel." Heizer Software publishes a catalog of appealing direct-mail offerings for business and education. These include the Excel-based Small Business Accounting System, with automatic posting, for \$99. Payroll Partner is also \$99, while Project Scheduler is a \$15 Ex-

cel template. Heizer also offers Microsoft Works templates and HyperCard stacks for business and education. Contact the company at 510/943-7667 or 800/888-7667 to receive a catalog.

Another business resource is *In Concert With Excel & Word for the Mac* (Hayden Books, 1992), by Dan Shafer. It's a terrible title but a rather good book (except for the dopey grand piano imprinted on every other page). Topics include using Excel as a database for Word mail-merge information, linking information within Word and Excel documents, and scripting Excel from Frontier. A floppy disk includes samples and scripts for the book, which is priced at \$34.95.

The 9-to-5 Mac (Hayden Books, 1992), by Steven A. Schwartz, is too broad in many ways; it tries to cover Mac basics such as desktop publishing and telecommunications in addition to more business-specific topics such as forms programs, contact management, and tracking expenses. Still, the \$29.95 book just may be saved by its accompanying floppy disk, which contains copies of more than 100 business templates.

Of course, the mighty Mac is a haven for macros as well as for templates. The *Complete Guide to Microsoft Excel Macros* (Microsoft Press, 1993), by Chris Kinata and Charles W. Kyd, demonstrates how to automate your use of Excel. Spreadsheet heavyweights will appreciate this second edition, which covers Excel 4.0 for both the Macintosh and Windows. Bucking the trend, this \$29.95 volume doesn't have a software disk.

To make up for that lapse, Microsoft Press does include a disk with *Microsoft Excel Macros: Step by Step*, by too many people to mention. This \$34.95 book (described as Official Microsoft Courseware; golly) packs a lot of clear, specific information into its 250 pages. It's a better intro than the *Complete Guide*, above.

Interesting Newsletter

ESTHER DYSON IS AN ESTABLISHED industry guru who writes a regular column for *continues*



Business templates,
telecom books,
practical
jokes, and more

Forbes, runs a technology forum every year, and publishes a monthly 20- to 24-page newsletter called *Release 1.0* for business types who need to know what future technology may bring. Dyson covers everything she believes will become important, even if it's esoteric now. That may mean an article on groupware one month and artificial life another. A subscription is \$495; call 212/758-3434 during EST business hours for a sample copy.

Macromedia User Journal is an independent, 24-page newsletter from Tony Bové and Cheryl Rhodes that comes out six times annually. The January-February issue included articles on Director tips and tricks; using MIDI sound and synthesizers with Director; and interface guidelines. A subscription is \$95; write P.O. Box 1289, Gualala, CA 95445, for a sample issue.

Our Friends the Feds

CONGRESS HAS ASKED THE NATIONAL Technical Information Service (NTIS) to disseminate the technical and scientific information it receives from federal agencies and other sources—something like 1300 reports weekly. NTIS began a pilot project in November to give the public access to some of that information online

via the FedWorld bulletin board system. Reports that can't be accessed online can be ordered online—since NTIS is funded by customers and not Congress.

FedWorld can be accessed at 703/321-8020 (parity, none; data bits, 8; stop bits, 1). Type **new** at the prompt and you'll shortly be online. Or call 703/487-4650 and ask for a copy of PR936, a one-page information sheet on the service, which is also a gateway to many other federal BBSs. FedWorld isn't Macintosh-hostile, but it's not exactly friendly; you'll probably need to use MacLink or another file-translation program to actually read the text files you download. There is a lot to access, from items on information technology to weather satellite image files to President Clinton's daily itinerary.

If you want to take the paper route, and why not, you can order the *NTIS Product & Services Catalog* (charmingly identified as PR-827/ACJ) by calling the NTIS number listed above. One example of an NTIS report is *Computer Viruses and Related Threats: A Management Guide*. This roughly 40-page guide defines viruses and similar hazards, discusses virus prevention for computer networks, and suggests additional reading. It also includes a contingency plan, a common-sense list of actions

that won't be news to experienced network administrators but should be helpful to small businesses.

Telecommunications

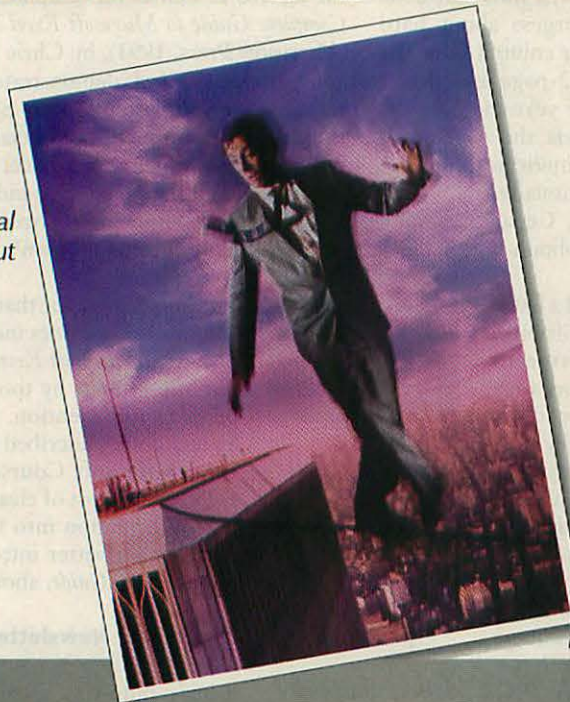
OPENMIKE IS A \$10 MONTHLY RESOURCE for MicroPhone II (4.0.2) and MicroPhone Pro users from Paul Celestin, who crafted the Loren module in MicroPhone Pro. OpenMike is a floppy disk with MicroPhone scripts, settings documents, and tips. The January 1993 issue, for example, includes a dozen new full-color icons to use with MicroPhone, part one of a DialogerPro tutorial, and advice on dealing with prompts. Call 800/835-5514 for details.

In the March and April issues of this column, I discussed online bulletin board systems and global networks. Since then I've run across two additional books that should be useful to people just beginning to explore the online world.

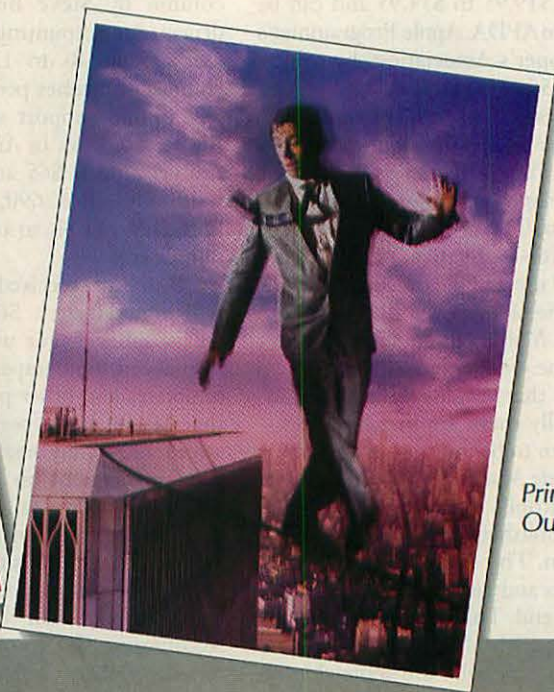
Yakety Mac: The Telecom Tome (Hayden Books, 1992), by Ross Scott Rubin, and *Dr. Macintosh's Guide to the On-Line Universe* (Addison-Wesley, 1992), by Bob LeVitus with Andy Ihnatko, cover roughly the same territory in vastly different ways and at different prices. *Yakety Mac*, \$34.95, is comprehensive, beautifully

WHEN COLOR CONSISTENCY

Original
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Printer
Output



Service Hero

Good dealers are worth their weight in gold (and a good thing too, given how much of our gold they get). Gregory Sloat of Minneapolis writes gratefully of First Tech Computer, where he bought a Macintosh IIci. Sloat didn't run into problems with his computer, but he did have problems with a LaserWriter IIx—bought from another dealer entirely. Although the printing problem wasn't First Tech's responsibility, "they replaced our defective toner cartridge (even exchange) with a new one," writes Sloat. "First Tech truly is a Service Hero!"

designed, and includes America Online software and a disk of shareware.

Dr. Macintosh's Guide, \$24.95, has a much more conversational tone and has much more direct advice. The book uses less than a page to describe the Prodigy online service, for example. "Prodigy stinks. Avoid Prodigy unless you have kids. Frankly, that's consistent with the majority of the online community's opinion about Prodigy (sometimes called

Plodigy because it's so darn slow)." *Yakety Mac* takes five and a half pages to cover the service and is more evenhanded (though not necessarily more on the money). Both books are useful; which one is more appealing is entirely subjective.

Legally Speaking

IN 1990 CALIFORNIA LAWYER JONATHAN ROSENBERG began writing a column for Stanford University's Macintosh User Group. Since then the column has grown into monthly reports called "CyberLaw" and "CyberLex," which cover legal issues that affect the computer industry. "CyberLaw" covers a specific issue, such as privacy and electronic communications, in some depth; "CyberLex" offers a summary of legal developments drawn from major publications. Rosenberg writes these reports as a labor of love; he doesn't charge for this service, which many other lawyers contribute to without compensation as well. It's terrific reading for anyone who, like me, is fascinated by the legal issues that sometimes face computer users and the industry. Many user group newsletters reprint these reports; America Online (703/893-6288 or 800/827-6364) and The WELL (415/332-4335) maintain forums for "CyberLaw" and "CyberLex."

Useless but Entertaining

CRUEL MAC TRICKS IS UTTERLY USELESS and not at all informative, but it is fun and cheap, so I'll mention it anyway. Cruel Mac Tricks is the digital equivalent of a whoopee cushion. One file simulates an error with the message "initializing hard disk." Another creates mistakes as you type. Then there's MacBarf, but let's not go into details. The disk offers 17 INITs in all; 2 are shareware, the rest freeware, and all should be compatible with most Macs. To order, send a \$5 check or money order to Owen Ink, 2227 15th Ave., San Francisco, CA 94116. And don't kid yourself—there is no such thing as customer support with a \$5 product.

But Wait, There's More

FOR MORE MAC RESOURCES, SEE *CONSPICUOUS Consumer*, June 1992, July 1991, and June 1990. If I've missed something particularly helpful, please drop me a line so I can include it in next year's column. In the meantime, happy computing. **m**

Send nominees for sainthood to Service Heroes, Macworld, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.

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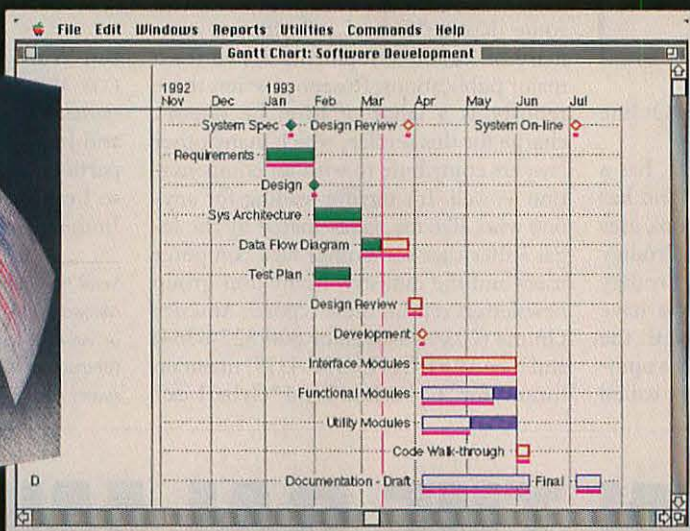
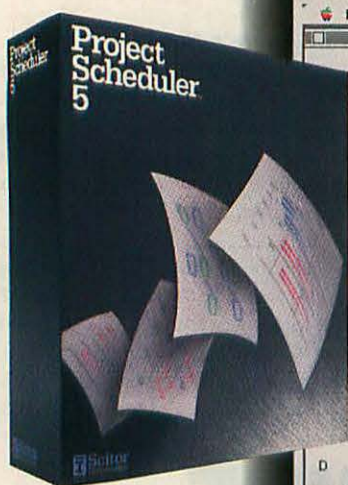
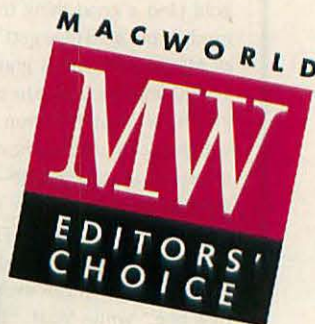


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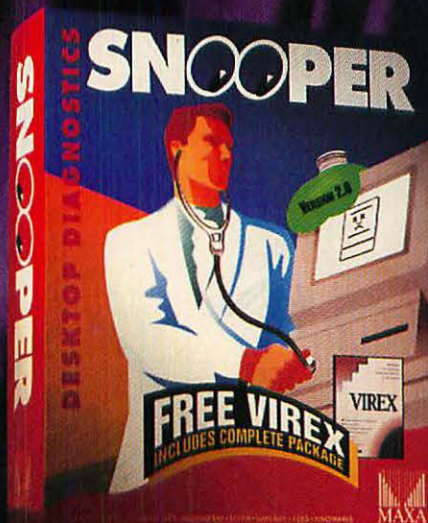
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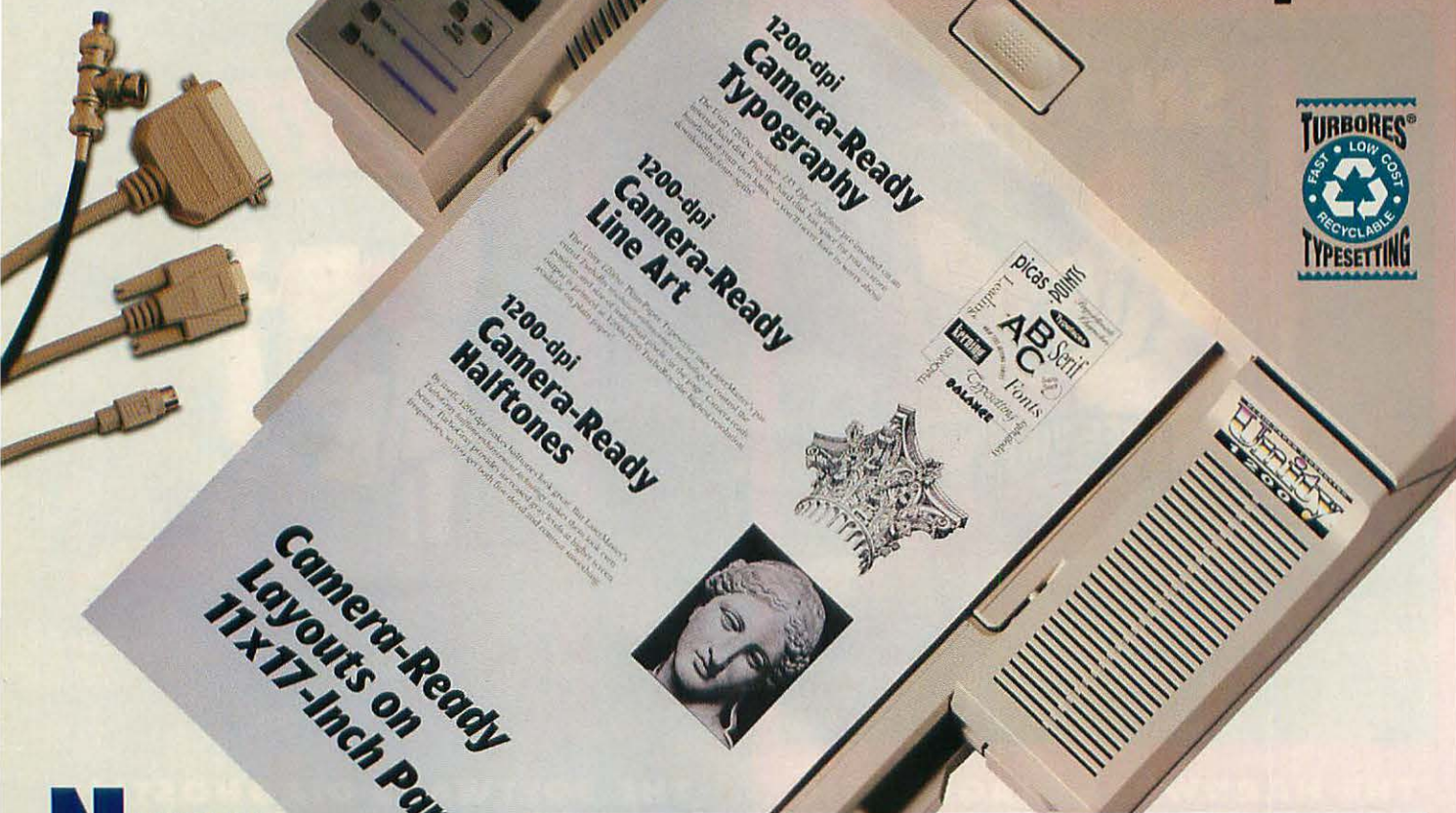
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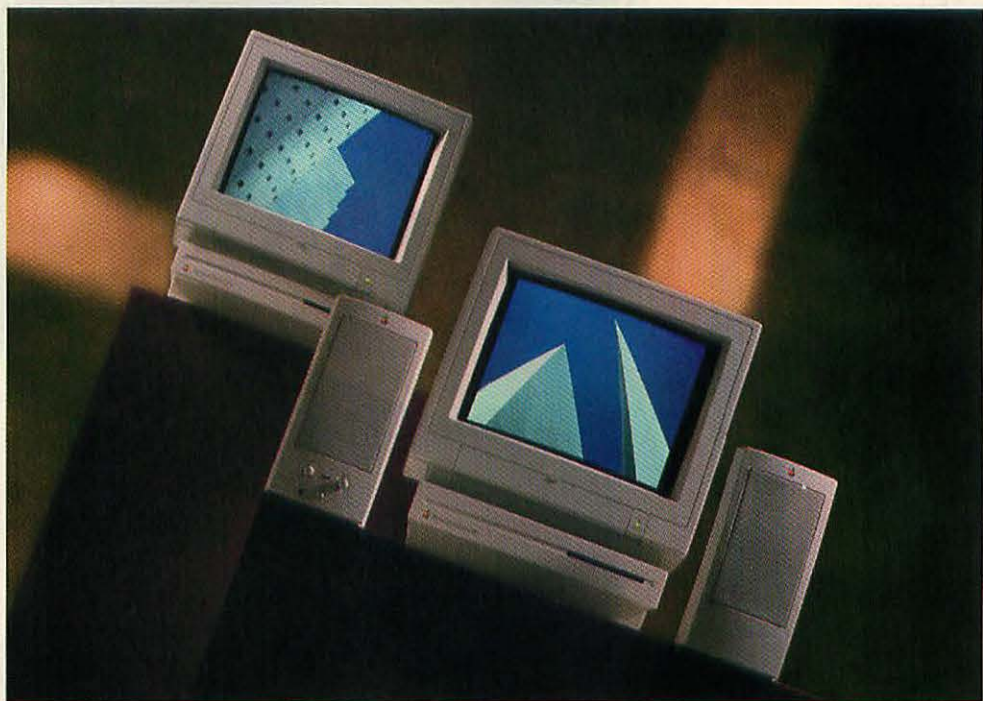
• HP LaserJet 4si

BY DAN LITTMAN AND TOM MORAN

Apple Launches Three More Performas

CONTINUING ITS price-war strategy of introducing lots of CPUs with more features and lower prices, Apple has brought out three new Performa models, all of which come with an external fax modem. The fastest system is the Performa 450; it's identical to the LC III but includes Apple's 14-inch Performa Plus Display, a 2400-bps data modem (from Global Village) with 9600-bps fax-send capability, and a slew of software programs. The other models are the Performa 405 and the Performa 430. Both are based on the LC II and include fax modems and 14-inch Apple Performa Displays; the 405 has an 80MB hard drive, and the 430 comes with a 120MB hard drive. Because it is based on the LC III, the Performa 450 has about twice the speed of the 405 and 430. Apple is discontinuing the older, LC II-based Performa 400.

The Performa 405 displays 16 colors, expandable to 256 with more video RAM. The 430 supports 256 colors; the 450 also supports 256 colors, but can display up to 32,768 colors with more VRAM. All the systems come with System 7.1P installed and with Best of ClickArt Collection, CheckFree, America Online, Spectre Challenger, Scrabble, American Heritage



AMONG THE LATEST OFFERINGS IN APPLE'S PERFORMA LINE ARE THE PERFORMA 430 (LEFT) AND PERFORMA 450 (RIGHT), BASED ON THE LC II AND LC III, RESPECTIVELY. BOTH SYSTEMS INCLUDE FAX MODEMS. APPLE ALSO INTRODUCED ITS APPLDESIGN POWERED SPEAKERS (FLANKING THE 450).

Dictionary, Correct Grammar, QuickTime, Macintosh PC Exchange, At Ease, and other software, depending on what kind of store you purchase the machine from.

Although Apple does not set suggested retail prices for the Performa line, it expects street prices of about \$1799 for the

Performa 450, \$1499 for the Performa 430, and \$1299 for the Performa 405. All were slated to ship in volume on April 19 through consumer electronics stores, department stores, and office products superstores.

Apple has also announced AppleDesign Powered Speakers, the first speakers designed spe-

cifically to work with a computer and be focused on a user sitting very close to the speakers. The \$179 speaker set has a built-in amplifier, shielding against interference from the monitor, and inputs for sound produced by the Mac and by a CD ROM drive. The speakers were slated to ship at the end of March.—T.M.

If the stories you've heard about Thunder/24™ led you to believe it's the fastest color graphics card, the results of a new, independent lab test will leave you thunderstruck.

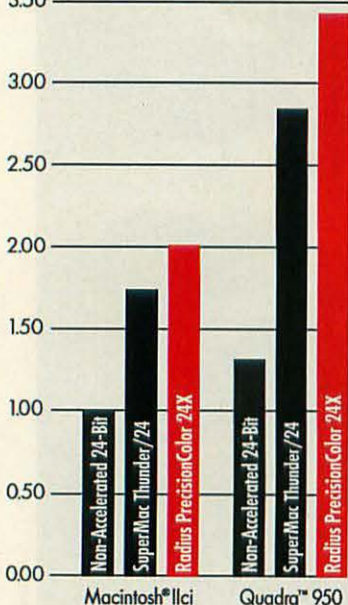
In a Hydra QuickDraw™ performance test, Ingram Laboratories found PrecisionColor 24X™ was up to 19% faster.

That's surprising, especially since the makers of Thunder/24 want you to pay \$1,250 more for their card.

PrecisionColor 24X isn't just faster and less expensive. It's also available in 7" and 9" versions. So it will fit in all of Apple's newly-announced systems, as well as current models.

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Lab Notes

A User's Guide to Distributed Rendering

BY MARK HURLOW AND TIM WARNER

ONE OF THE HOTTEST NEW TRENDS IN personal computing is distributed processing—dividing up a complex, time-consuming task into smaller chunks and assigning them to a group of networked computers or accelerator boards. Image processing tasks, especially rendering, are well suited to distribution. Not only does distributed rendering save time, it can also maximize computer use during off hours when machines would normally be idle.

In looking at options for "Building the Ultimate Mac," Macworld Lab reviewed

four distributed-rendering packages—Strata's RenderPro for Strata 3D, Ray Dream's DreamNet for Ray Dream Designer, Specular International's BackBurner for Infini-D, and Pixar's NetRenderMan for modelers that support Pixar's RIB file format. We used several configurations, some networked and some using accelerator boards (such as the Rocket 33) that fit into a Macintosh's NuBus slot.

We rendered a 3-D model into an image with each package using a Quadra 950 sending jobs to both three and six additional IIs over thin Ethernet, and a Quadra 950 sending the job to three Rocket 33's on its own NuBus. When we distributed the same job over several processors, performance improved dramatically. The Rockets beat the other configurations hands down, accelerating processes to less than a third of the time needed on a plain 950, and half the time needed over a six-node network of IIs.

Divvying Up the Pieces

EACH PACKAGE USES LOW-LEVEL PROGRAM routines to split up a rendering job into many pieces. The computer initiating the job—the *host*—first sends a message

across the network alerting other processors—the *clients*—that it has a file to render. Once clients have responded (through an extension), the host sends each client a database describing all the objects in the model; then the host splits up the job—a single frame if it's a still image, one frame at a time if it's an animation (DreamNet handles only still images)—into pieces, which it sends one at a time to available clients. The host reassembles the completed pieces, which march across its screen, slowly filling in

like panes in a window; finally, the full image is saved to disk. Each processor receives an identical set of rendering parameters (settings such as lighting or shading) that apply to the entire image; however, NetRenderMan and BackBurner, unlike the other programs, send texture maps (which apply to specific areas of the image) only to the clients that need them.

Since all the programs work in the background, rendering jobs can continue processing while the client machine is being used for some other task. But users of the client machines have ultimate control; through control panels, they can turn off access or limit access to off hours so they don't have to put up with sluggish computers. Strata's RenderPro and Specular's BackBurner let you suspend a job in progress for later execution. NetRenderMan lets you set a time for the rendering to begin. DreamNet renders immediately, but can be interrupted.

Each program also gives you some control over which computers will join the work force. DreamNet, BackBurner, and NetRenderMan let you designate groups of computers to act as clients. NetRender-

continues



HANK OSUNA

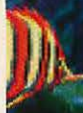
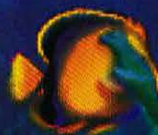
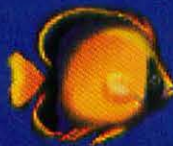
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Man even lets you specify a minimum number of clients that must be available in each group before a render will start. (According to Pixar, Unix machines running NetRenderMan software can also be used.) Strata, on the other hand, lets you create a list of zones, and RenderPro uses every available machine in the zones that have been configured with its software. With the exception of NetRenderMan, the host can be configured as a client so that it does part of the rendering too.

When Disaster Strikes

OBVIOUSLY, WHEN YOU ARE DOING work on numerous machines, over a network, in the background, or overnight—work unmonitored by human eyes—you need to know how well a rendering job will survive catastrophe. A render might be interrupted by something as simple as a user taking back control of a client machine, or by something more drastic like a network or host-machine crash.

When a client crashes, is turned off, or is reclaimed by a user, the host detects an error and redirects that client's work to the next available client. If the network crashes, the host—if it's also a client—continues to process the job, redistributing all the pieces to itself. If the host is only an administrator, the job stops—but can be resumed later.

But what if the host computer crashes? Bad news, right? Well, no. In our tests, BackBurner and RenderPro reliably recovered from each of these scenarios. Both programs saved frames as they were completed, so we never lost more than one frame. BackBurner provided an additional benefit, saving each piece as it was completed, so nothing was lost. Connections to clients were reestablished as soon as they were available again, and work continued. Despite Ray Dream's claim that renders in progress can be recovered 80 percent of the time when the host machine crashes, we could not recover a single job. DreamNet does handle network crashes reasonably well, but clients that crash while rendering a piece are not available until the next time Ray Dream Designer is run on the host machine. Additionally, we encountered numerous system crashes when we were trying to configure Ray Dream to render over a network. NetRenderMan makes no claims about recovering from network or host crashes, but we also found that when single clients are lost, the final images are incomplete, and therefore unusable. Because NetRenderMan must start at the beginning of the RIB file for each rendering job, you should search for modelers that create separate RIB files for each frame of lengthy animations to reduce the

time penalties of rendering failures.

Each company claims that the size of the model being rendered and its final resolution are limited only by available RAM and hard drive space. Since each package loads the whole model into the host's memory, a large model may require tens of megabytes of RAM on the host. Clients usually need only a few megabytes. When approaching the 16MB limit for a PICS-formatted file (BackBurner sets the limit to 13MB), RenderPro and BackBurner automatically create an additional file for the overflow. QuickTime doesn't care how big the file gets, so you could conceivably render animations that are hours long.

How Much Time Can You Save?

FROM THE RESULTS OF OUR TESTS we deduced that with all the renderers, four Ilci's—or one Rocket accelerator—could perform about as well as one Quadra 950. No renderer limits the number of clients you can use, but eventually you reach the point of diminishing returns. NetRenderMan hosts bog down at about 20 clients; RenderPro prefers only 8; BackBurner usually runs out of pieces to send to clients at 60 nodes; and DreamNet's speed doesn't improve much beyond 17 nodes. Our rendering tests found DreamNet and BackBurner the fastest, with RenderPro a bit slower. NetRenderMan crept in at half the speed of its competitors; because the host cannot easily be configured to assist in rendering, the NetRenderMan configurations in our tests did not receive the host Quadra's help. Additionally, NetRenderMan did not benefit proportionately to others from additional Macs, needing six Ilci's instead of three to match the processing power of a Quadra 950.

We also experimented with the YARC NuSprint board, a 25MHz RISC processor designed to accelerate many image processing applications, but of the packages we tested, only NetRenderMan is currently compatible with it. We found the YARC board to be roughly equivalent to four Quadra 950s. Multiple boards can be used in parallel, so you can have several in one machine—if you can afford the \$3495 each. Specular has also just announced support for the YARC board.

With systems like the ExpanseNB8 chassis, which expands a 6-slot Mac II's NuBus to 13 slots, Radius's rumored multislot server scheduled to be announced this summer, and specialty boards like the YARC NuSprint, there's no shortage of alternatives for speedy rendering. You need only figure out how much money you can reasonably spend, and how much time you need to save. **m**

Hot Prices for Thermal Printers

SEIKO INSTRUMENTS USA has cut the list price of its entry-level thermal-image-transfer color printer to just under \$3000. The Personal ColorPoint PSE, featuring full PostScript compatibility, is now list-priced at \$2999, down from \$3999. The revised pricing drops the PSE into the same range as mainstream color ink-jet and bubble-



THE PERSONAL COLORPOINT PSE IS A POSTSCRIPT COLOR PRINTER THAT LISTS FOR \$2999.

jet printers, including the \$3495 HP PaintJet XL300 and the \$2349 Apple Color Printer. The PSE, which can support serial, parallel, and LocalTalk interfaces, prints color images with up to 300-dpi resolution on standard letter- and legal-size paper as well as international sizes. The printer comes standard with 17 Type 1 fonts and 5MB of RAM, expandable to 21MB using standard SIMMs. Seiko has also introduced the Professional ColorPoint PSH, a PostScript-compatible dye-sublimation printer priced at \$9999. Seiko Instruments USA, 408/922-5800.

—JONATHAN CASSELL

AppleScript at Last

APPLE IS FINALLY rolling out AppleScript, a scripting language for controlling applications and for making applications work together.

AppleScript-compatible applications, including the already-shipping Finder 7.1, PageMaker 4.2, FileMaker Pro 2.0, and Excel 4.0, store data and issue commands in ways that are easily described with a script. For example, a user could write a script that tells PageMaker to import a range of cells from Excel, or that tells Excel to send data to FileMaker and create new records for each row.

For users, Apple will ship an AppleScript interface late in 1993 that will watch user actions and record them as scripts. But AppleScript is fundamentally a programming language, so tools for commercial developers and a tool kit for VARs will come first. (Apple says most commercial developers will support coding scripts first, and later support recording scripts.) Some commercial applications will include an AppleScript editor and a run-time version, so the adventurous can start hacking, and some companies are likely to beat Apple to market with easy-to-use AppleScript utilities. For details, call the Apple Programmers and Developers Association, 408/562-3910.—D.L.

Hi Finance Gets a Face-lift

Aatrix's personal-finance package Hi Finance is being upgraded to version 5 with a new interface that puts most commands within reach of a button click. For people who want to be reminded daily of their place in the world, the current version of Hi Finance, 4.09, calculates your net worth each time you launch the program, automatically recalculating debts and assets based on interest rates, estimated appreciation of real estate holdings, and so on. Hi Finance isn't an investment planner like Reality Technologies WealthBuilder, but you can set up annuities, bonds, and other investments as accounts, and download securities information from online services. (For more about personal-finance software, see "Money Matters," in this issue.)

Version 5.0 will be able to dial up a modem from home and warn you at the office if your favorite stock slips. The new version will add a double-entry bookkeeping option; simple unlinked budget categories and checking accounts will still be available. The price will remain \$129. Aatrix, 701/746-7202.—D.L.

Illustrator 5.0

Challenges FreeHand

Adobe's Illustrator 5.0 is challenging rival Aldus FreeHand for the high end of the drawing software market with many hot new features, including unlimited layers.

Users can create object groups that span layers and can keep objects on some layers in preview mode while objects on other layers stay in draft mode. Version 5 supports pressure-sensitive pens and add-ons that perform specialized tasks—for example, the Pathfinder tool, which finds path intersections automatically to help with combining shapes or subtracting one shape from another.

Illustrator 5.0 has moved many functions previously found in dialog boxes to floating palettes. It has an extensive set of high-end color-management tools and much-improved text features; adds unlimited undos, interruptible redraw, graduated fills, and the ability to draw in preview mode; and has custom views that remember zoom level, visible layers, and so on. Version 5.0 will ship this summer for \$595. Adobe Systems, 415/961-4400.—D.L.

News



A BOOK COVER CREATED BY JOHN RITTER USING ILLUSTRATOR 5.0, SHOWING THE PAINT STYLE AND LAYERS PALETTES.

TREND

Reach Out and See Someone

Desktop video conferencing (DVC) has long been a favorite technology demonstration of Macworld Expo keynote speakers. It is finally available in real products, but it comes with a high price tag and hefty hardware requirements. DVC lets you see the person you're speaking with and share computer screens. Systems come with cameras, other required hardware, and software that provides a mix of features: annotation of shared documents, high-speed file transfers, video-snapshot capture, and others.

Northern Telecom's \$3899 Visit Video provides monochrome video, a shared whiteboard-style window with annotation, and file transfers. Visit Video requires a switched 56 or ISDN digital phone line and a Northern Telecom digital PBX or equivalent.

Compression Labs' Cameo Personal Video System needs ISDN. It delivers two-way color video at 15 frames per second and transfers files, and a new upgrade provides screen-sharing.

Cameo's price ranges from \$4000 to \$5000 depending on components.

ShareVision Technology offers the \$4499 ShareView Plus, which works over standard analog phone lines and, instead of a whiteboard, allows users to share documents from any Mac program.

Compression Labs, 408/435-5000; Northern Telecom, 800/667-8437; ShareVision Technology, 415/772-8400.—TOM NEGRINO



TALKING HEADS: TWO PEOPLE HAVING A TÊTE-À-TÊTE OVER STANDARD PHONE LINES USING SHAREVIEW PLUS.

20 lb. copy paper

80 lb. text

60 lb. marbled paper

60 lb. text

80 lb. cover

24 lb. bond

20 lb. yellow pages paper

60 lb. marbled vellum

It can take any paper you feed it.



Have you ever wondered what your design would look like printed on a grocery bag? Okay, maybe not. But when you're working with a Phaser™ III color printer, your thoughts do tend to go a little wild.

Because you can feed the Phaser III any kind of paper, from 80 lb. bond to acetate. Even paper towels. It also takes sizes up to 12" x 18" for printing tabloid bleeds. And with 16.7 million colors delivered at 300 dpi, you get gorgeous color on any media.

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Tektronix



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Circle 143 on reader service card



A Manager's Tool Kit

Over the years, Palo Alto Software has published a series of spreadsheet templates for solving specific business problems, such as writing a business plan or predicting sales performance. Now Palo Alto is addressing the big picture with Business Management Toolkit.

Business Management Toolkit straddles the line between financial management and project management. The program walks the user through planning the tasks that must be completed and writing a task-oriented budget; making sure someone is responsible for each task; and keeping track of whether tasks are completed on time and within budget. Business Management Toolkit is \$149.95 and requires Excel or Lotus 1-2-3. Palo Alto Software, 503/683-6162.—D.L.

DiVA Diversifies

DIVA (DIGITAL VIDEO APPLICATIONS) is upgrading its flagship product, the QuickTime-movie editor and special-effects package VideoShop, to version 2.0 and introducing new video tools to differentiate VideoShop from rival Adobe Premiere.

VideoShop 2.0's new features include audio mixing, titling, and real-time motion control. The product will also support QuickTime 1.5 features including searchable text, Photo CD, and multiple language sound tracks. It will provide multiple-track video effects and an image-compositing canvas. The package no longer requires HyperCard, and should list for between \$500 and \$700.

The new Sparrow, a simple-to-use, under-\$300 QuickTime editor optimized for the LC, and the Digital Delivery Kit, for creating and publishing interactive QuickTime movies, are slated for this spring. Analog Tool Kit, which controls professional video equipment from within VideoShop 2.0 and supports SMPTE time



DIVA'S SPARROW, AN EASY-TO-USE QUICKTIME EDITOR GEARED FOR LOW-END MACS. TYPES OF MEDIA ARE COLOR-CODED.



BUG REPORT

Microsoft Works 3.0 On 68000-based Macs (Plus, SE, Classic) with less than 4MB of RAM, fast typists will overflow Works' keyboard buffer and lose data. Microsoft is not planning to fix this in the near future. Works' database module runs extremely slowly in the early release of 3.0. A patch is available free to registered users who request it.

Microtek ScanMaker II The ScanMaker comes set to SCSI ID 6, and version 2.03 of the ScanMaker's Photoshop plug-in will delete the contents of a disk drive if the drive's ID is also set to 6. This problem is fixed in version 2.04, which is available free on request.

Texas Instruments microLaser Some units are incompatible with Farallon's PhoneNet cable and connectors. The problem does not affect Apple's LocalTalk hardware and is fixed in newer units.

Apple Personal LaserWriter LS The LS can't print margins narrower than 1 inch on legal-size paper. The problem does not affect letter-size paper. Apple says it plans a software fix but does not know when it will be available.

Fidelity Chessmaster 2100 Under System 7, version 1.3 may take your turn and show other aberrant behavior. An upgrade is due this fall.

MACWORLD WILL SEND YOU A BUG REPORT T-SHIRT IF YOU ARE THE FIRST PERSON TO INFORM US OF A SERIOUS, REPRODUCIBLE BUG THAT WE REPORT IN THIS COLUMN. SEE HOW TO CONTACT MACWORLD.

Digital F/X's Latest Stab at Video Editing

Digital F/X has ripped back the shower curtain on Hitchcock, a \$7995 digital video-editing package that bears the name of the late, great director of *Psycho*. Hitchcock purchasers will drop the NuBus board into their Macs, and then plug in their favorite video deck. The board digitizes and JPEG compresses video footage straight to the hard drive in real time, where it can be edited using the included software. Hitchcock supports up to 640 by 480 resolution at 30 frames per second, according to the company. A minute of video will occupy about 20MB to 40MB of storage space, depending on the desired frame size, speed, and resolution. The editing software features professional tools, such as split edits and an external controller option with a jog-shuttle and dedicated control buttons.

Once the footage has been tweaked, users can either print JPEG-quality video back to tape, or generate an edit decision list (in CMX, GVG, or Sony formats) for assembling the final product using the original materials. Digital F/X says it sees Hitchcock as competing directly with Avid's MediaSuite Pro. Digital F/X, 415/961-2800, 800/955-8273.—CAMERON CROTTY

News

A Forgiving Disk Array

MASS MICROSYSTEMS has brought out the MassterArray, a Fast SCSI-2 device that holds five hard drives that can be set up in several different RAID (redundant array of inexpensive disks) configurations. The MassterArray comes in two versions: one holds 2GB, the other holds 4GB. Both use drives with average seek times of 10.5ms, but the effective seek time of the array can be as low as 2.25ms due to striping of the data across the disks. The data-transfer rate of the array can be as high as 10MB per second, according to the company. For added data security, parity information is distributed across all the drives, so if one drive fails, the data on it can most likely be reconstructed.

The 2GB version lists for \$20,299; the 4GB for \$24,199. Both versions include an internal backup tape drive and are shipping now. Mass Microsystems, 408/522-1200.—T.M.



MASS MICRO'S MASSTERARRAY RAID CONTAINS FIVE HARD DRIVES AND ONE TAPE DRIVE.

Get a Mac.
Install some programs.
Do some cool stuff.
Run out of disk space.
Throw away some files.
Get more cool programs.
Run out of disk space, again.
Get Stacker for Macintosh.
Do more cool stuff.

It starts with the tutorials. Then the templates. Pretty soon you're dragging your help files into the trash. Next it's the extra fonts. Finally, the games. And you're still tight for disk space.

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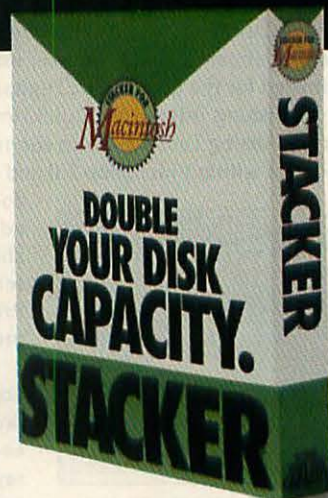
Stacker is a software program that doubles your disk capacity. Once you've "stacked" your hard disk, nothing about your Mac changes except your available disk space. Stacker is totally transparent and completely safe — just ask the four million people who already use our technology.

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THE 17-INCH NEC MULTISYNC 5FG MONITOR IS INTENDED FOR BUSINESS AND MULTIMEDIA USERS.

NEC Enhances Monitors, Lowers Prices

NEC TECHNOLOGIES HAS created three monitors in its popular MultiSync FG series, each of which offers a higher refresh rate at a lower cost. The E series monitors—the MultiSync 3FG, MultiSync 4FG, and MultiSync 5FG—are all intended for general business use, while the 4FG and the 5FG are also suited to multimedia and other color-intensive applications, according to NEC.

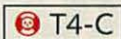
The NEC MultiSync 3FG and MultiSync 4FG, which replace the existing 3FG and the 4FG, are both 15-inch color monitors with slightly higher maximum refresh rates of 76Hz and estimated retail prices about \$50 lower than their predecessors; they list for \$635 and \$755, respectively. The MultiSync 5FG, a completely new 17-inch color monitor, lists for \$1155, about \$200 less than the 5FG, which NEC said it will continue to sell for color imaging and other high-end graphics-intensive applications.

All three of the monitors offer resolutions up to 1024 by 768, but at that resolution the 3FG's refresh rate drops to 60Hz. The three displays work with a wide variety of graphics boards. The 4FG also has NEC's AccuColor color-calibration technology. The 5FG was slated to be available in early April, with the two 15-inch monitors to follow at the end of April. NEC Technologies, 708/860-9500.—T.M.



VIRUS WATCH

CURRENT VIRUSES, TROJAN HORSES, AND WORMS



TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 6/93
INFO: A modified version of T4-A and T4-B
IMPACT: All three versions of T4 damage system files and applications

CDEF (mutation)

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 6/93
INFO: A minor modification of an older virus
IMPACT: Not destructive; can cause crashes



TYPE: Trojan Horse
FIRST LISTED IN VIRUS WATCH: 5/93
INFO: Claims to be a new version of Compactor Pro, but when launched it attempts to reformat mounted hard drives and floppies
IMPACT: Can delete data; may be more likely to affect floppy disks than hard drives

Mirror Brings Out Hi-Res Scanners

Mirror Technologies has begun selling four flatbed color scanners, including a model priced at less than \$1000 and a pair of models with hardware JPEG acceleration. The Mirror 600 Plus Color Scanner, which has a suggested list price of \$999, can scan with up to 600-by-600-dpi resolution. The Mirror 800 Plus Color Scanner, list-priced at \$1299, offers 800-by-800-dpi resolution. The Mirror 600 Pro Color Scanner and the Mirror 800 Pro Color Scanner include all the same features as the Plus scanners and add hardware JPEG compression, which cuts down on scanning time and can compress images by a ratio of 50:1. The Mirror 600 Pro Color Scanner has a list price of \$1399, and the Mirror 800 Pro Color Scanner has a list price of \$1699. All four scanners support document scaling from 1 to 100 percent and can scan in 3-, 12-, and 24-bit color modes as well as in 4- and 8-bit gray-scale. Mirror Technologies, 617/633-4450.

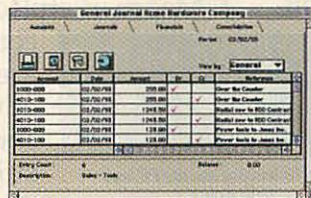
—JONATHAN CASSELL

Accounting You Can See

REALWORLD, A GREAT PLAINS competitor in the DOS character-based accounting market, is entering the Mac market with Visual Accounting (VA), a high-end, multiuser modular accounting system that sports a graphical interface and will compete with Great Plains' recently announced Dynamics (see "Great Plains' New Plans," in February's *News*).

RealWorld's first VA module will be a general ledger, which should ship this spring, to be followed by receivables and payables this summer. A report writer with a forms-design front end and support for financial functions, IF-THEN statements, and so on, is scheduled for later. For serious modifications, RealWorld will license its source code (VA is written in C++). Visual Accounting modules start at \$795. RealWorld, 603/224-2200.

At least one reseller is already developing a Visual Accounting add-on: Pride Retail Systems, whose ClerkProof point-of-sale software runs on RealWorld's Unix platform, will write a point-of-sale system for smaller stores that run on Visual Accounting. Pride is at 617/890-1121.—D.L.

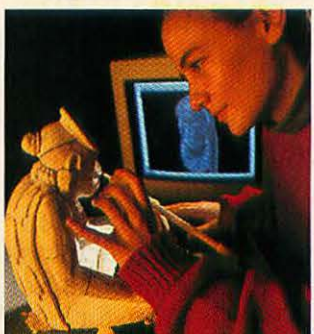


VISUAL ACCOUNTING'S GENERAL LEDGER WITH LIST OF JOURNALS. TABS ACROSS TOP LEAD TO OTHER GL FUNCTIONS.

News

Scanning in 3-D

To convert real objects into computer models without drawing them from scratch in a three-dimensional modeler, you need a three-dimensional digitizer like HyperSpace from Mira Imaging.



ERICA WALCZAK OF KLEISER-WALCZAK CONSTRUCTION CONVERTING AN OBJECT INTO A 3-D MODEL FOR AN ANIMATION.

HyperSpace combines software; a digitizing pen that records points, lines, and polygons as you touch its tip onto points on the surface of an object; and a special table that emits an electromagnetic field to track the pen's location. The software includes such 3-D features as lathing, extruding, and lofting, and it provides four kinds of shading (which help you find digitizing mistakes). It can export files in DXF, Swivel, and numerous other 3-D formats.

HyperSpace can't digitize metal objects, so most users work from replicas of clay or wood. Mira Imaging may add support for other hardware, including optical devices that can digitize metal, and landscape-surveying devices.

Mira's systems are \$7850 with 1mm resolution at 15 inches from the transmitter, or \$12,850 with 0.1mm resolution. Mira Imaging, 801/466-4641.—D.L.

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When it comes to friendliness and ease of use, a mainframe is the antithesis of a Macintosh®. But with IRMA™ WorkStation for Macintosh, your Mac® can become a full partner with your host, creating a powerful synergistic collaboration.



It runs with NetWare

IWM now supports NetWare for SAA.

IRMA WorkStation for Macintosh now adds NetWare for SAA® and TN3270 over TCP/IP support to an

already impressive list of connectivity options. It includes productivity enhancers like KeyStroke Macros, to automate common tasks; QuickPad™ and QuickHit™ for point-and-click navigation of host applications; and QuickPoints™ to simultaneously resize

PF1 Process o
PF2 Open the r
PF3 Search fo

QuickHit lets you execute PF keys with a click.

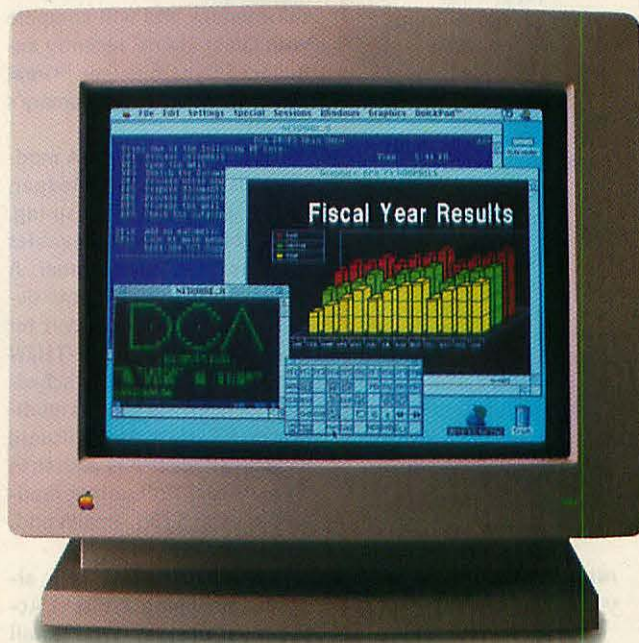
QuickPad, QuickHit and QuickPoint productivity enhancers, multiple sessions, APA graphics and full System 7 support are just a few of IWM's strengths.

screen and fonts.

The recent merger with Avatar® has further strengthened DCA's commitment to the Mac marketplace. And now, our

combined resources are focused on advancing the most comprehensive suite of Mac connectivity products

ever. In fact, we offer the only complete line of Mac-to-host software and token-ring and coax hardware. As well as the only family of micro-



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Until June 30, you can trade up to IWM from an earlier version—or any competitive product—for only \$95. (That's \$330 off the suggested retail price. And the price can be even less, when you buy MultiPaks of 10, 50 or 100.) You can also call for free

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J. SCOTT CAMPBELL

TREND

Streamlining Bulk Mail

For companies that send bulk mailings, climbing postage rates, a new generation of mailing-list software, and the promise of substantial postage discounts make it increasingly attractive to maintain a clean mailing list.

At least two Mac products, both CD ROMs, conform to the U.S. Postal Service's Coding Accuracy Support System (CASS) standards, correcting zip codes and addresses, adding carrier route numbers, and then spitting out the form required for a postage discount. Semaphore's ZP4, at \$125 per quarter, cleans up text files or addresses inside Apple-events-aware database managers. Satori Software's BulkMailer C.A.S.S., \$150 a quarter, works with Satori's recently upgraded mailing-list managers, Bulk Mailer 4.0 and Bulk Mailer Plus 4.0.

The \$195 BulkMailer adds bar-coding, improved duplicate-address elimination, and a layout editor for designing custom labels and reports. BulkMailer's database tops out at 8000 records. The \$395 Bulk-Mailer Plus can handle 300,000 records, generate Post Office reports, and select a random subset of records for test-mailings. Satori Software, 206/443-0765; Semaphore, 408/688-9200.—D.L.

Caffeinate Your Color Classic

FOR THOSE WHO already want more speed in their Color Classic or LC III, DayStar Digital has adapted its Universal PowerCache accelerator for those machines. Designed as a general-purpose accelerator, the Universal PowerCache works with most existing Macintoshes using a series of different adapters available from DayStar.

The Universal PowerCache lists for \$449 for a 33MHz 68030 to \$999 for a 50MHz 68030 with FPU math coprocessor. The adapters for the Color Classic and LC III both list for \$49. All the products are available now. DayStar Digital 404/967-2077, 800/962-2077.—T.M.

Display Boards Support Centris

Two 24-bit display boards from Radius fit in the Centris 610's shorter NuBus slots and also work in existing longer NuBus slots. The \$1849 PrecisionColor 24X/1152 offers resolutions up to 1152 by 870 pixels. The \$999 PrecisionColor 24XK/1024 offers resolutions up to 1024 by 768 pixels. Both provide accelerated 24-bit color and support monitors up to 21 inches in diameter. Radius, 408/434-1010.—T.M.

NEC Supports Multisession Photo CD

NEC Technologies has updated its line of CD ROM drives by improving their average access times and transfer rates and adding multisession support for Kodak's Photo CD photo service. Users can now add more photos to an existing disc. The portable MultiSpin 38 now has a 400ms average access time; the MultiSpin 74 now has a 280ms average access time. Both Mac-compatible drives can transfer data at up to 300 KBps in multisession mode, which spins the disc twice as fast as usual.



NEC MADE ITS MULTISPIN 38 (TOP) AND MULTISPIN 74 FASTER AND ADDED MULTISESSION CAPABILITY.

TOM GIBSON

News

Now shipping, the MultiSpin 38 lists for \$465; the MultiSpin 74, for \$615. Both require a Macintosh Interface Kit that retails for \$35. NEC also offers an upgrade program for owners of its CDR series of CD ROM drives. NEC, 708/860-9500. For upgrade info, call 800/388-8888.—T.M.

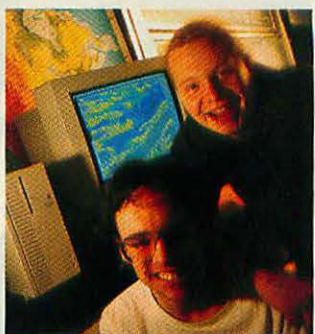
Watching the Weather

OWNING EQUIPMENT to capture and analyze weather images from satellites might sound like an extravagance. But for commercial fishermen, bush pilots, scientists, and others far from television news, Newcastle Computing's MacSat may be a necessity.

MacSat captures satellite images and imports them to the Mac, where they can be colorized, annotated, and displayed in a series to show atmospheric changes over time.

With satellite dish, antennae, receiver, analog-to-digital converter, other electronics, and software, MacSat systems range from about \$4000 to about \$8500, depending on the dealer and what

kind of satellites you want to track. Contact U.S. Satellite Laboratory, 301/604-6155, or Roffsat, 305/271-9229. For \$465, Roffsat sells extra image-analysis and satellite-tracking software and rewritten MacSat documentation.—D.L.



BRIAN SWALE

JUSTIN BURKE (LEFT) AND ILAN BERGER OF FAIR LAWN SCHOOL IN NEW JERSEY STUDY THE WEATHER WITH MACSAT.



TURKEY SHOOT

DESIGN FLAWS NOTED

Apple File Exchange It's not Apple's fault that DOS whacks off those long, poetic names Mac users tend to give their files. But Apple File Exchange sure could make it prettier. Say your full-size Mac file names have three-letter extensions staring AFE in the face: AFE ignores them and blindly makes an extension out of the first three letters that follow the truncated eight-letter name.

Quark or Tektronix Which is the turkey? You be the judge. Seems QuarkXPress 3.1.1 is missing some PostScript code that was in 3.1, making Tektronix's Phaser unable to print Quark documents. Tektronix has taken to shipping Phaser owners a disk with printer drivers (PDF files) for Quark 3.0, 3.1, and 3.1.1. In fact, Tektronix may need to supply Phaser owners with new PDF files for every upgrade of QuarkXPress. Ah, progress.

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See *How to Contact Macworld*.

Looks like Mac users just got their very own HP LaserJet.



The new generation HP LaserJet 4M printer.

At last. An HP laser printer built specifically for the Mac—the new LaserJet 4M. A laser printer with everything Mac users need. From built-in PostScript™ Level 2 software from Adobe™ to standard LocalTalk and optional EtherTalk.

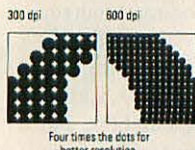
The finest print quality in its class.

Thanks to HP's microfine

toner, Resolution Enhancement technology, and advanced engine designed expressly for 600 x 600 dpi, the LaserJet 4M printer delivers the finest print quality of any 600 dpi machine available.

And with a new RISC processor and 6 MB of standard memory accelerating formatting and I/O speeds, complex

options of a 500-sheet tray and power envelope feeder.



Four times the dots for better resolution.

And it's designed to be shared simultaneously by PCs and Macs. Automatic language switching between PCL 5 and PostScript, and 3 hot I/Os give mixed environments greater flexibility. Without compromise to either.

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LaserJet

4M

The HP LaserJet 4M is the one for all. Macintosh and PC alike. This new generation provides superior output with 600 dpi, Resolution Enhancement technology, and microfine toner. All built-in memory means that PostScript and full-page graphics print out crisp, clear and fast.

- True 600 dpi creates rich, full-dimensional text and graphics.
- Smoother curves, no jagged edges, thanks to HP's exclusive Resolution Enhancement technology.
- Microfine toner makes 600 dpi output look even sharper.
- 35 PostScript Type 1 typefaces for Mac and PC PostScript language users.
- 35 Intelligent and 10 TrueType typefaces for PC users produce a broad range of document styles.

Microtech Offers Capacious Hard Drive

FOR THOSE WHO hanker after gigabytes, Microtech International has brought out one of the largest hard drives for the Mac: the Nova XL2700, a 2.7GB hard drive with a high-speed SCSI 2 interface. The drive is formatted with two partitions, one 2048MB and the other 730MB, to accommodate the Mac's limit on the size of partitions. The XL2700 has an 11ms average seek time and a burst data-transmission rate of up to 10MB per second.

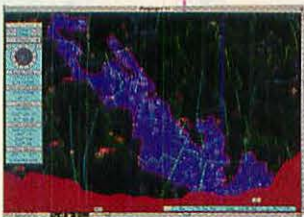
Hard Drives for the Centris 610

Microtech International has begun offering internal hard drive mechanisms that require less electrical power than many hard drives and can therefore work in the Centris 610. Also compatible with other Macs, the \$1329 Europa 400i and the \$1469 Europa 500i drives store 400MB and 500MB, respectively. Microtech has also announced price cuts of 25 percent to 46 percent in its Nova hard drives. Microtech International, 203/468-6223.—T.M.

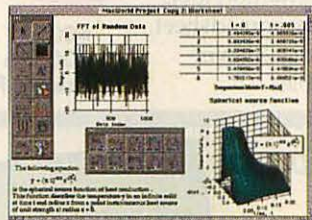
Galactic Mac

IF CITY LIGHTS BLOCK all but the moon from your night sky, take a look at Carina Software's recently upgraded Voyager II. Voyager generates star charts and can simulate a planetarium display. Besides showing the celestial sphere from Earth, Voyager can simulate a view from anywhere within the Solar System—for example, you can see what Earth looks like from the Moon. The program's database includes more than 50,000 stars, galaxies, binary and variable stars, planets, moons, comets, and other objects.

Voyager II retails for \$159.95. Extended star catalogs, deep sky objects, and variable and double stars are available as add-ons ranging in price from \$20 to \$45. Carina, 510/352-7328.—PHILIP CHIEN



VOYAGER'S VIEW OF THE NORTHERN SKY. SYMBOLS SHOW DEEP SKY OBJECTS, AND THE MILKY WAY IS IN PURPLE.



HIQ 2.0'S ENGINEERING LOOK: MATHEMATICAL FUNCTIONS ON BUTTONS, AND GRAPHS AND TABLES EMBEDDED IN TEXT.

HiQ Tackles Engineering Problems

Several products provide symbolic mathematical manipulation, but Bimillennium's HiQ lets engineers and scientists apply high-powered math directly to raw data for real-world problem solving. HiQ uses a project worksheet interface combining library functions, preprogrammed problem solvers, and graph-drawing tools. You can turn one of ten supplied problem solvers loose on tasks like solving ordinary differential equations or polynomial roots. Or write your own scripts in HiQ's object-based scripting language, choosing from 600 functions including transcendental, matrix, and Fourier analysis. Then graph results in 2-D or 3-D, with optional animation. Bimillennium is upgrading HiQ to version 2.0, with a reorganized interface, on-page text editing, and expanded math functions. HiQ lists for \$995. Bimillennium, 408/354-7511.—MEL BECKMAN

MicroNet Offers Storage for New Macs

MicroNet Technology is now shipping a broad line of storage devices for Apple's recently introduced Macintosh Quadra 800, Centris 650, Centris 610, and LC III computers. The storage devices feature a set of internal 3½-inch hard drives for the Quadra 800, a set of medium-performance drives for the Centris models, and a set of low-end drives for the LC III. For external storage, MicroNet is offering a dozen 3½-inch drives for all four new Macs. The company is also shipping internal and external versions of a 3½-inch Sony 128MB optical drive, a Photo CD ROM drive, 44MB and 88MB SyQuest removable-cartridge drives, and an 8GB 4mm digital audiotape (DAT) drive. Lastly, MicroNet is offering six versions of the Raven 030 two-drive disk-array system for the Quadra 800 and Centris 650, with capacities ranging from 642MB to 4060MB. MicroNet Technology, 714/581-1540.

—JONATHAN CASSELL

Epson Unveils Color Scanners

Epson America has brought out two 24-bit color scanners: the ES-600C for office administration applications and the ES-800C for desktop publishing. The ES-600C has a resolution of 600 dpi, the ES-800C's resolution is 800 dpi. Both scanners normally take one pass to capture an image, but they can take three passes if necessary for color separations.

The ES-600C lists for \$1129 and the ES-800C lists for \$1499 without an interface kit. The Mac interface kit is \$399, including the complete version of Adobe Photoshop 2.0, the necessary SCSI cable, the desk accessory, Caere OmniPage Direct TryPack OCR software, and driver software. The company has begun shipping both scanners and the interface kit. Epson will also offer a document feeder and transparency handler. Epson, 310/782-4000.—T.M.

TREND

The Virtual Power Lunch

A new teleconferencing package may save companies travel expenses and meeting-room costs by enabling colleagues to hold a conference over a network or via modem without leaving their desks.

The Virtual Meeting System (VMS) is a set of four programs that synchronize a presentation and permit participants to ask questions or illustrate their points using Apple-events-aware applications or VMS's own whiteboard-like draw program, which lets everybody in the conference see what the presenter draws.



Conference participants install a conference application, a QuickTime-movie-and-slide player, and the whiteboard program, along with presentation files (which must be distributed before each conference takes place). A conference server on a separate computer manages and broadcasts the presentation and can be controlled by any participant.

The Virtual Meeting System requires System 7 and costs \$3500 for the first ten users and \$300 for each additional user. RTZ Software, 408/252-2946.

—CAROLYN BICKFORD

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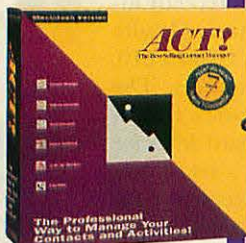
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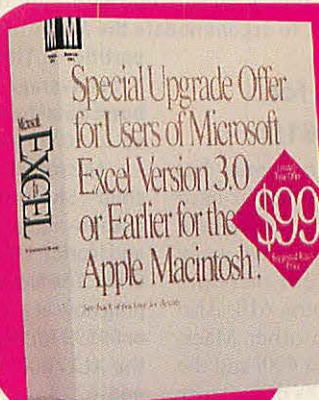
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New features in Microsoft Excel 4.0 will make your presentations sizzle:

- Even easier to use
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Special upgrade price requires proof of ownership of an earlier version of Excel. Microsoft #04545

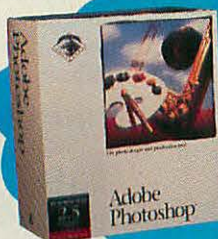
#00227 MS Excel 4.0 \$294
#00356 MS Excel 4.0 License Pack \$244

Adobe Photoshop 2.5

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#04042

- Works with scanned photographs, slides or electronic artwork from scratch
- Full range of filters, painting, drawing and selection tools
- Artistic control and precision
- 24-bit color!



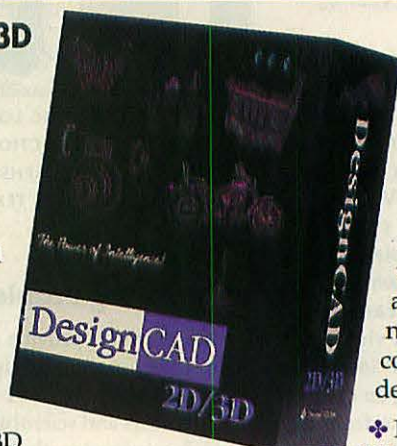
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DesignCAD 2D/3D

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- DesignCAD is a revolutionary and professional computer-aided design and drafting package
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and electrical), animation, desktop publishing and multimedia

- Provides you with all the speed and accuracy you need to manipulate complex 2D and 3D designs
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(MacRenderMan).
American Small Business #04180

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- One of the highest performance Macintosh modems available
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Global Village #06267



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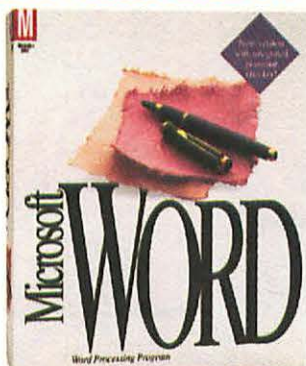
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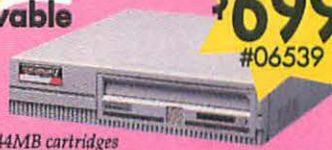
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Required mounting bracket sold separately

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- ❖ Limitless storage potential on SyQuest cartridges! Does not format 44MB cartridges



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#06760 ✓	Performantz 8.0GB DAT w/Retrospect	\$1,698
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*#06733 ✓	Performantz 170MB INT	\$398
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01871	Payroll 4.0	\$108
05745	Peachtree Insight Accounting for Mac	\$298
04230	Quicken 3.0	\$44

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04893	Microphone II 4.0	\$144
04168	QuickMail 2.5.1 10User	\$374
02881	White Knight II	\$84

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03478	FileMaker Pro 2.0	\$268
02648	4th Dimension 3.2	\$598
02581	MS FoxBase + Mac 2.01 Engl	\$328
05323	Userland Frontier 2.0	\$184

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00203	Crickit Graph III 1.0	\$118
04803	Deltagraph Pro	\$199
04806	Org Plus for Mac 1.0	\$124

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04465	Clarix Works	\$194
04032	Great Works	\$88
04027	MS Office 3.0	\$474
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05251	ACT! for Mac	\$248
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03466	FastTrack Schedule 2.0	\$164
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03837	IThink 2.2	\$424
01159	Mac Flow 3.7	\$214
04161	MS Project for the Mac 3.0	\$444
04140	MacProject Pro	\$396
04720	Nolo's Living Trust	\$43

Presentation

00346	Aldus Presentation 2.1	\$324
06299	MS PowerPoint 3.0 Upgr	\$328
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06275	Pointwrite	\$149
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05521	Panose Process Color Imaging Guide 1000	\$61
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03497	Adobe Type Mgr. 2.0	\$56
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03969	MacValue Pack	\$39
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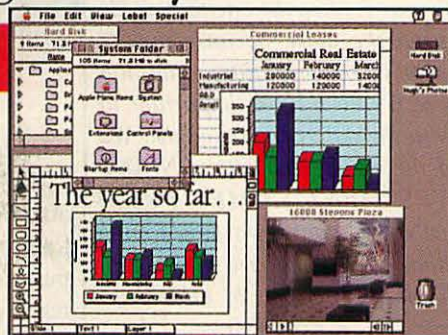
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05481 IntelliDraw	\$188	\$177	05688 Where In The World			Out Numbered	\$33	\$28
04573 PageMaker 4.2	\$494	\$479	Deluxe	\$46	\$41	05126 SuperSolver		
05493 Personal Press 2.0	\$98	\$88	CD-ROM Versions:			Midnight Rescue	\$34	\$29
00346 Persuasion 2.1	\$324	\$309	06108 Arthur's Teacher Trouble	\$44	\$39	05652 SuperSolvers Spellbound	\$34	\$29
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Amaze, Inc.			Central Point Software			04754 The Writing Center	\$51	\$41
05072 Cathy Daily Planner 2.0	\$48	\$38	06763 Anti Virus Mac	\$48	\$33	Lotus		
04706 Farside Daily Planner 2.0	\$49	\$39	03481 Mac Tools	\$104	\$84	00507 123 Mac Upgrade	\$298	\$278
06168 Trivial Pursuit 2.0	\$48	\$38	06648 Safe & Sound	\$37	\$27	00227 Excel 4.0	\$294	\$274
Apple Computer			Chipsoft			02581 Foxbase 2.01	\$328	\$308
06297 Apple Font Pak	\$68	\$53	06164 MacIn Tax	\$49	\$39	01220 Powerpoint 3.0	\$328	\$308
05432 Mac PC Exchange	\$68	\$53	Claris			04161 Project 3.0	\$444	\$424
Berkley			05749 Claris Works Version 2	\$196	\$181	04898 Word 5.1	\$294	\$274
02785 After Dark	\$28	\$23	03478 FileMaker Pro 2.0	\$268	\$258	00567 Works 3.0	\$158	\$138
05934 After Dark: Star Trek	\$35	\$30	06290 MacWrite II	\$88	\$78	Symantec		
Broderbund			06525 MacWrite Pro	\$174	\$154	04890 Norton Utilities 2.0	\$94	\$74
03970 Bannermania	\$28	\$23	Diva			00116 SAM 3.5	\$64	\$49
03994 Kid Pix	\$33	\$28	06002 VideoShop	\$398	\$378	WordPerfect		
05512 Kid Pix Companion	\$24	\$19	Intuit			05738 LetterPerfect	\$94	\$84
05479 Mac USA	\$34	\$29	04230 Quicken Mac	\$44	\$39	03972 WordPerfect Mac 2.1	\$278	\$258
04328 MacGlobe	\$38	\$33	Learning Company			06303 WordPerfect Works 1.2	\$158	\$148
04197 Playroom 2.0	\$28	\$23	01856 Reader Rabbit 1	\$35	\$30			
05649 Prince Of Persia	\$31	\$26						

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Spyglass Upgrades Visualization Tools

SPYGLASS IS upgrading its scientific visualization tool, Spyglass Transform, to version 3.0, and its Spyglass Dicer to version 2.0. Transform is for looking at 2-D data sets, while Dicer is for looking at 3-D data. Neither pro-

gram creates graphs; instead, they display arrays of numbers as colors. Transform creates colored surface contours (it can also import bitmaps), and Dicer creates colored cubes that can be carved up to reveal what's inside. Both applications provide great control over colors, useful for narrowing in on a certain range of numbers.

THE AMCOEX INDEX OF USED MAC PRICES

Machine/RAM/Hard Drive	Average Sale Price	Monthly Change
Mac SE/2MB/20MB	\$650	-\$25
Mac Portable/1MB/40MB	\$650	-\$50
PowerBook 100/4MB/40MB	\$950	\$0
PowerBook 140/4MB/40MB	\$1500	+\$50
Mac Classic/2MB/40MB	\$650	-\$50
Mac SE/30/2MB/40MB	\$1150	-\$100
Mac LC/2MB/40MB	\$650	-\$50
Mac II/4MB/40MB	\$1150	+\$50
Mac IIsi/3MB/40MB	\$900	-\$100
Mac IICx/4MB/80MB	\$1350	\$0
Mac IIfx/4MB/80MB	\$1750	-\$50
Mac IIfx/4MB/80MB	\$2200	-\$300
Apple 12-inch B&W display/board	\$125	\$0
Apple 13-inch RGB display/board	\$375	\$0
LaserWriter Plus	\$725	\$0
LaserWriter IINT	\$1100	+\$50

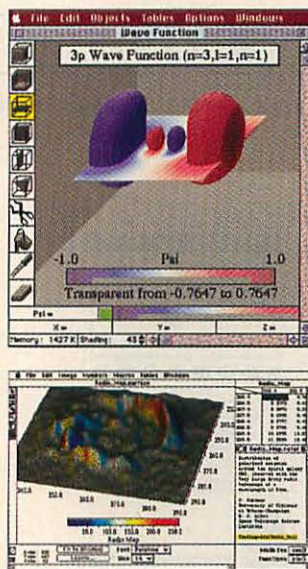
Index provided by the American Computer Exchange of Atlanta, Georgia (800/786-0717). It reflects sales during week of March 23. Configurations include keyboard and exclude monitor and display board for noncompact models.

TOP FIFTEEN BUSINESS SOFTWARE PACKAGES

Months on chart	Last month	This month	
97	2	1	Microsoft Word Microsoft Corporation
88	1	2	Microsoft Excel Microsoft Corporation
19	3	3	Microsoft Office Microsoft Corporation
49	5	4	FileMaker Pro Claris Corporation
74	4	5	Microsoft Works Microsoft Corporation
18	7	6	MacDraw Pro Claris Corporation
11	6	7	ClarisWorks Claris Corporation
35	8	8	Quicken Intuit
49	9	9	WordPerfect for the Macintosh WordPerfect Corporation
37	11	10	QuarkXPress Quark
27	13	11	MacProject Claris Corporation
12	10	12	1-2-3 for the Macintosh Lotus Development
84	12	13	Aldus PageMaker Aldus Corporation
72	15	14	MacWrite II Claris Corporation
7	—	15	Microsoft PowerPoint Microsoft Corporation

Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during February 1993.

New to Transform are scientific labeling and tick marks, improved import capability, ties to Mathematica through Math-Link, an interpolation technique called Kriging, and an improved macro language. Transform is \$595. New to Dicer is the ability to draw isosurfaces, make oblique slices through data, and annotate and label images. Dicer is \$695. Spyglass, 217/355-6000.—D.L.



SPYGLASS DICER (TOP) AND SPYGLASS TRANSFORM PROVIDE A QUICK WAY TO VISUALIZE LARGE SETS OF NUMBERS.

HP LaserJet:

Dpi up, Price Down

Hewlett-Packard recently announced its new top-of-the-line printer, the 17-ppm, 600-dpi \$3749 LaserJet 4Si, which replaces the LaserJet IID and LaserJet IIISi printers. The 4Si includes PCL 5, 2MB of RAM (expandable to 34MB), a parallel interface, and two slots for HP JetDirect interfaces. The \$5499 MX version adds an additional 8MB (expandable to 26MB), Adobe PostScript Level 2, and LocalTalk and Ethernet interfaces for concurrent support of the Mac Operating System, NetWare, Windows, LAN Manager, LAN Server, EtherTalk, HP-UX, Sun OS, Solaris, and SCO Unix workstations residing on multiple networks. The printers automatically switch interfaces and page-description lan-

News

Digitizing Your File Cabinet

Micro Dynamics' Archiving and Retrieval System (MARS)—for storing, searching, and retrieving massive quantities of scanned documents and computer files on optical jukeboxes—is being restructured and upgraded to version 3.0.

MARS 3.0 puts functions previously spread across several applications into MARS Workstation, an omnibus program for assigning keywords, creating archives, setting up access privileges, and searching for files (document scanning still uses a separate application). Version 3.0 can black out sensitive information or add notes on top of a scanned image; archive and play QuickTime movies; and display archived text files. Micro Dynamics is also launching Viking, which lets multiple MARS servers be linked; provides an Oracle- and Unix-based server; and has Windows retrieval capability.

Pricing depends on installation size. Micro Dynamics, 301/589-6300.—D.L.



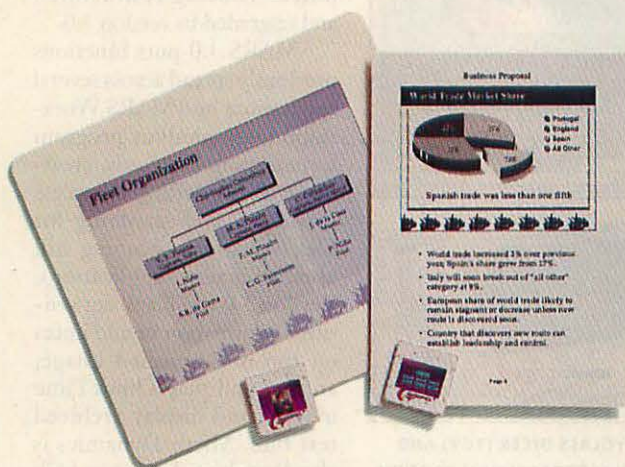
THE HP LASERJET 4Si MX PRINTS 17 PPM AT 600 DPI AND SUPPORTS MULTIPLE NETWORKS.

guages. Both come with two user-selectable 500-sheet, letter-size paper trays. Options include a 1500-sheet paper feeder, a 100-piece envelope tray, a 500-sheet output bin, and double-sided printing. Hewlett-Packard, 800/538-8787.—OWEN W. LINZMAYER

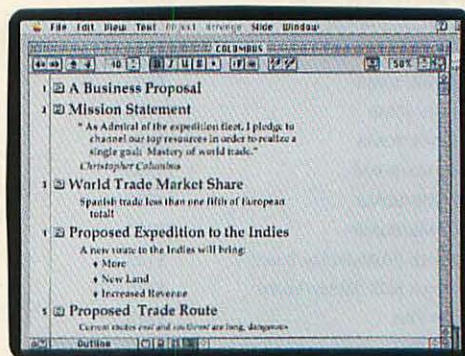
New PowerPoint 3.0. tools make power



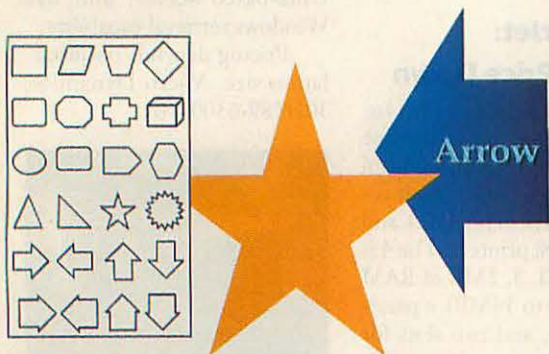
The toolbar. A powerful way to save time. Because now the most commonly used features are just a point and a click away.



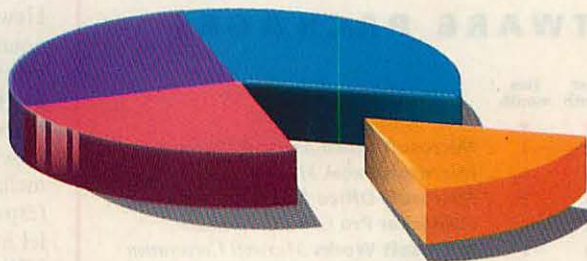
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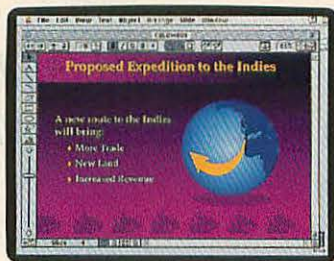
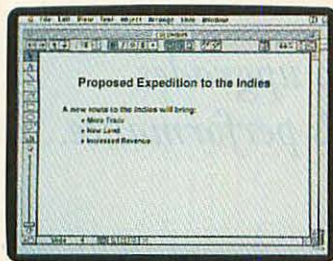
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quinted: title page of user's manual or Disk 1 of the program. Reseller prices may vary. Plus applicable sales tax and freight if ordering directly from Microsoft. Offer good only in the 50 United States (00) 563-9048; outside the United States and Canada, call (206) 936-8661. Microsoft and PowerPoint are registered trademarks and Windows is a trademark of the Microsoft Corporation. Macintosh and Persuasion are registered trademarks of Cricket Software. Symantec MORE is a trademark of Symantec Corp. Installation of PowerPoint version 3.0 for the Macintosh requires System 7 to run.

Upgrading Your Mac

Feeling underpowered? Macworld's special guide to upgrades will help you boost your Mac's performance.

by Galen Gruman

N

o matter which Mac you use, sooner or later you'll want something faster, bigger, better. More colors, more storage, more memory, and above all, faster speed. With nearly two dozen models of desktop Macs in use today, the upgrade possibilities seem endless—and bewildering.

But take heart: *Macworld's* special section on upgrading will help you get the best possible performance from your Mac—for the best possible price. These articles offer specific upgrade advice and product recommendations for every desktop Mac, from the Plus to the Quadras, in each of the four Mac lines: compact, low-cost, midrange, and high-end.

This introduction explores issues that apply to all Macs, with an eye toward helping you get started on the right upgrade path.

Ask Yourself Four Questions

Before wondering which upgrade products you should buy, ask yourself the following questions.

1. Do I need to upgrade? If you're now retouching scanned images or working with QuickTime movies when you used to use just a word processor and electronic mail, the answer is yes. If your system performance has slowed to a crawl because you've installed System 7 and newer, memory-hungry versions of your favorite programs, the answer is yes. But if you've realized that there are faster Macs out there and you feel left out, the answer is most likely no.

However you answer this question, make sure you assess what you do on your Mac and what you're likely to do in the near future, then evaluate those tasks

against the processing power your Mac has right now.

2. Will basic enhancements solve my problem? Often, you need only a system enhancement (additional memory, a larger monitor, greater color support, and the like) to get rid of a bottleneck that makes your Mac seem underpowered. For example, if your only problem is sluggish file opening and saving, you probably need a faster hard drive. But if practically everything you do seems to be taking forever, it's time to upgrade your Mac.

3. Do I need an accelerator or a logic-board replacement? Accelerators speed up a Mac's processing and sometimes add support for additional monitors. But an accelerator doesn't update or replace the ROMs or other special Apple features on the logic board.

Guide to Macworld's Special Report on Upgrades

COMPACT SERIES, page 94
Classic, Classic II, Color Classic, Performa 200,
Plus, SE, SE/30

LC SERIES, page 100
LC, LC II, LC III, Performa 400, Performa 405,
Performa 430, Performa 450

MIDRANGE SERIES, page 104
Centris 610, Centris 650, II, IIci, IIcx, IIvx, IIx,
Performa 600

HIGH-END SERIES, page 110
IIfx, Quadra 700, Quadra 800,
Quadra 900, Quadra 950

Logic-board replacements (available from Apple for just some Mac models) let you exchange your Mac's logic board for a newer version. But this option can be very expensive, and the performance gains you get may be very small (see "When to Replace Your Logic Board").

If the difference in price between an accelerator and a logic-board upgrade is minimal, go for the logic board; it's a better long-term strategy.

4. Do I upgrade or buy a new Mac? If you expect to run sophisticated programs and peripherals that take advantage of the latest Mac offerings, like QuickTime and the forthcoming Open Collaboration Environment, go with a new Mac—high-end peripherals and programs tend to use the functions in newer Macs that an accelerator board doesn't offer. Otherwise, an upgrade will probably suffice—for now.

Pick the Right Upgrade Products

Once you've determined an upgrade strategy, it's important to evaluate the products available based on their performance; features relevant to your work; price; and customer support (those are the qualities we looked at when evaluating products for our suite of upgrade stories). What follows are some guidelines for Mac owners on what to look for in system enhancements.

Memory The first upgrade for almost any Mac is RAM. If you want to run System 7 and hefty applications such as Microsoft Word 5.1 and Microsoft Excel 4.0, you should have at least 8MB. You can get by with 4MB of RAM only if you

stick to running one major program at a time and keep the number of system extensions to a minimum.

Not all Macs use the same RAM boards (called SIMMs, for Single In-line Memory Modules). You need to know both the type of SIMM (which you can tell by the number of pins) and the SIMM speed (expressed in nanoseconds, or ns) that's appropriate for your Mac. If you want to install it yourself—and it's relatively easy to do on most Macs—make sure you buy the appropriate RAM by telling the dealer or mail-order sales agent which Mac you plan to install the memory in (see the "Guide to Memory Upgrades" pullout table).

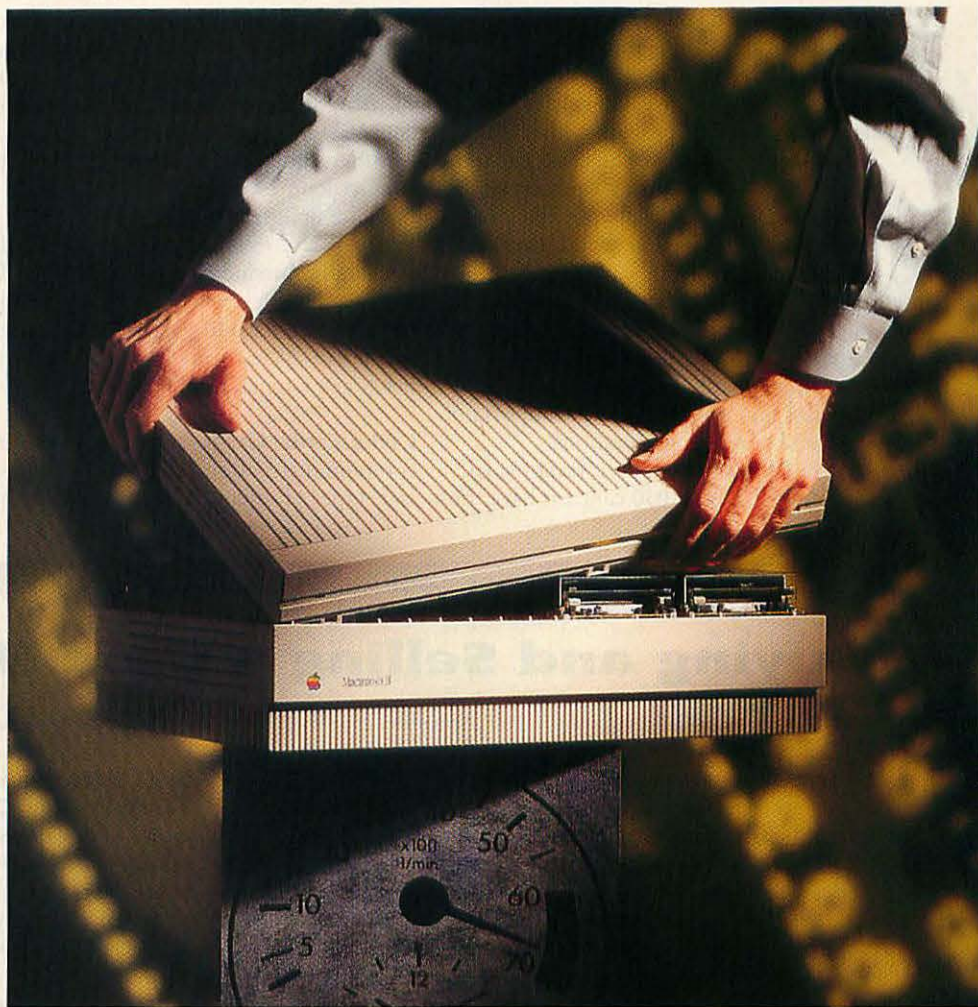
System 7 introduced a new form of memory, called virtual memory, that makes the Mac think a portion of a hard drive is RAM. This means you can run programs that require more memory than you actually have, but because it's disk-based, virtual memory is much slower than RAM. Most compact Macs don't support virtual memory, even with Sys-

tem 7, unless Connectix's Compact Virtual 3.0 software or Apple's 32-Bit System Enabler is installed.

Accelerator Boards Accelerator boards tend to stretch the Mac's inner workings in ways Apple never intended, so incompatibilities with both very new and very old programs and peripherals are likely to occur. In addition, not all companies test their accelerator boards thoroughly on all supported Macs.

All vendors provide software fixes to customers who report problems; some companies automatically give the fixes to all customers who might be affected. We discovered that most accelerator vendors give good or exceptional technical support—Impulse Technology and Mobius Technologies both had excellent scores in our support tests, and only Dove Computer had a score of satisfactory.

Some accelerator board incompatibilities are caused by the board's processor. The 68040 in particular has several compatibility issues that might affect you.



PHOTOGRAPHS BY PAUL FRANK MOORE

68040 Cache If a piece of software is incompatible with the 040, your system will crash when you try to use that application. The reason is that some applications can't recognize the 040's internal cache. Most software vendors have updated their programs to work with the 040, so make sure you have the latest version. For software that hasn't been updated, many accelerator vendors provide a control panel that lets you switch the 040's cache mode on or off.

Processor Variants Some vendors, such as Fusion Data Systems, Radius, and Total Systems, use 040 variants, which can cause incompatibilities. These processors cost less and use less power—important sales and design considerations.

An 040 can have three variants: LC, EC, and ELC. (An 030 can also have the

EC variant.) LC indicates that there is no built-in math coprocessor. EC means that the built-in Paged Memory Management Unit (PMMU) is missing (a PMMU lets a Mac use virtual memory under System 7). ELC indicates that both the math coprocessor and PMMU are missing. Another code, RC, is not a variant but simply denotes that all processor functions are built in.

Virtual Memory Most 040-based accelerators are incompatible with virtual memory (which is why many vendors use the cheaper EC040 variant). The one exception Macworld Lab noted was DayStar's Digital Turbo 040 line.

Cache Cards Cache cards, which store common instructions and data in a special type of memory that the Mac's

processor can access quickly, are another form of acceleration. The IICI, IIVx, and Quadras are the only Macs that support cache cards.

If your Mac supports a cache card but doesn't have one, strongly consider adding one. You can increase performance by 10 to 20 percent for between \$200 and \$400—enough, perhaps, to keep you from buying more acceleration than you really need.

Math Coprocessors Beware the ads that promise spreadsheet speed improvement if you buy a math coprocessor (also called an FPU, for floating-point unit). The truth is that only a specialized set of mathematical operations—trigonometric and transcendental—take advantage of the math routines imprinted in a math

Buying and Selling a Used Mac

by Saul D. Feldman

When it comes time to upgrade, logical economic questions arise: Should I upgrade the computer I have or sell it? And if I sell it, should I buy a more advanced model that's used? Here are some tips to help you buy and sell a used Macintosh, plus a brief look at the possible tax consequences.

Three Ways to Buy

Expect to save about 20 percent of the street price of current Macs by buying them used, says Charles Thompson, general manager of the Boston Computer Exchange (BCE), a clearinghouse for used-computer buyers and sellers. But he recommends that only experienced computer users buy used machines because first-time owners need more hand-holding than an individual seller would offer.

There are three ways to buy a used Mac.

1. From an individual. Look for ads in newspapers, on computer bulletin boards, and through your local user group.

Pros: Prices are the lowest. Sellers often sweeten the pot by leaving software on the hard drive.

Tips: If you plan to use that software, check for viruses. Also, get the original disks and documentation. Policies on the transfer of ownership vary among vendors.

Claris, Symantec, and WordPerfect let the original purchaser transfer ownership. Without this transfer of ownership, you aren't eligible for those all-important upgrades.

Cons: You probably won't receive any guarantee from the seller, so make sure the computer is working properly.

Tips: Inexpensive diagnostic

software such as Maxa's Snooper, MicroMat Computer Systems' MacEKG, Polybus Systems' Peace of Mind, and Teknosys's Help can examine such things as system memory, the monitor, the drives, and SCSI and serial ports.

Pros: Dealers typically offer warranties ranging from 30 days to one year.

Cons: Warranties are only as good as the reputation of the dealer.

Tips: Check out the dealer's reputation with local user groups. You have some protection if you pay by credit card: if something goes wrong and the warranty isn't honored, you can ask your credit card company to withhold payment until the dispute is settled.

3. Through a service. You can also go through an intermediary, such as BCE, which serves as a link between buyer and seller.

Pros: The intermediary maintains a database of used computers. A customer orders the computer through BCE, for example, which holds the money in escrow until the computer is received. After receipt,

all computers are guaranteed for seven days. BCE will honor the warranty even if the seller reneges.

Cons: You may get a better deal if you negotiate yourself.

Three Ways to Sell

If you are selling your Macintosh, you have the same three routes available to you.

1. Sell it yourself.

Pros: You'll probably get the most money if you sell the Mac on your own.

Cons: Be prepared for phone calls days, even weeks, after the computer has been sold. Also, dealing with strangers can set you up for other problems. A few years ago, thieves in the San Francisco Bay Area used computer classifieds to find people who had electronic equipment ripe for stealing.

Tips: If you're selling your Mac to a stranger, get payment in cash, money order, or certified check. Try to check for some valid form of identification if you have any qualms.

2. Sell to a broker.

Pros: Selling your Mac to a used-computer broker lets you avoid the hassles of selling it yourself.

Cons: You won't get as much money. I called several, offering to sell a Mac SE/30 with 4MB of RAM, an 80MB hard drive, and an extended keyboard. Companies offered to pay anywhere from \$900 to \$1050.

1.44 Ext. Floppy, Modem, \$800 obo.
985-2515, evens. 408/974-7770, days.

MAC SE
SUPER DRIVE. 4 MB RAM/40 MB HD.
EXCELLENT MACHINE. COMPLETE
WITH SOFTWARE & MANUALS. \$1000.
415/664-1426.

PowerBook 100 2/20 w/ ext. floppy, case,
SCSI adaptor cables, Word v. 5.1, Excel v.
3.0. \$975 obo. 415/397-7672.

MAC Ili
5/105, 3 months old, software. \$2300 obo.
510/652-9319.

MAC Power Book 140 4/40
Warranty. Excellent condition. Carrying
case. \$1550 obo. 415/501-5518.

MAC 15" SCSI II w/ FP Monitor for Plus
and later. \$500. 415/431-1414.

MAC QUADRA 700
20 Mega RAM, 1.5 Mega V-RAM. New
Power Supply. \$3350. Call Eric at
415/377-0136 or 510/581-9356.

coprocessor. If you don't know what these calculations are, you don't need a math coprocessor.

Video Display Since the fall of 1990, Apple has included built-in color monitor support for new Mac models, letting you hook up standard color monitor sizes (12-inch and 14-inch) without adding a video-display board. But you need a display board if you have an older Mac.

A sluggish display board or built-in video can make a system seem to run slowly when in fact the bottleneck is getting the image to the monitor. In addition, a small monitor can require extra scrolling, which slows your performance. Speedy video-display boards and larger monitors solve those problems.

Because many Macs have only a few expansion slots, vendors are increasingly turning to multifunction display boards. These include accelerator boards with a video port, video-display boards with Ethernet, and video-display boards with video-capture and video-presentation capability. If you have few slots available—whether NuBus or Processor Direct Slot (PDS)—the multifunction approach merits strong consideration.

For Macs with built-in video, the most cost-effective way to upgrade may be to add video RAM (VRAM). More VRAM will not speed up your display, but it will

When to Replace Your Logic Board

Sometimes, the best way to upgrade your Mac is to replace its main logic board. But this can also be the least cost-effective approach, so how do you know when a logic-board upgrade makes sense? Follow these three guidelines.

1. Consider what you're getting for the money. Most Apple logic-board upgrade kits cost too much for what they deliver. A notable exception is the \$599 LC III upgrade for LC and LC II owners.

2. Be sure a logic board—and not an accelerator board—is what you need. To be worth the money, a logic-board replacement must offer sufficient new capabilities. Look for expanded video support, higher-capacity system buses, more storage capacity, faster SCSI ports, higher RAM capacity, and built-in extras like Ethernet. If a logic board doesn't offer at least several of these features, an accelerator board may be a better-performing, less-expensive alternative.

3. Avoid investing in a dead-end Mac. Apple has clearly decided that the Classic series, LC series, Ilvx/Centris 650, and Quadra 800 are the platforms for the long term, so you are likely to get good support—and more upgrade options—for these machines for years.

let your monitor show a wider range of colors. The "System Upgrades" table shows what VRAM expansion can deliver for each Mac.

Storage The constant improvements in hard-drive technology mean that yesterday's fast drive is today's slowpoke. The solution is to buy a faster hard drive, but

don't worry about getting the fastest. Unless you own a Centris or Quadra, your Mac has its own limit on how fast it can communicate with a hard drive. Drive speed is measured in milliseconds (ms) and referred to as *access time*; speeds of 15ms to 23ms are fine for most Macs.

If you have a Quadra or other fast Mac, consider getting a SCSI accelerator, especially if you're using the Mac as a database server or you're working with large image files.

Other Options There are several upgrade options that might apply to your Mac: slot extenders that add NuBus or PDS slots; ROM upgrades for older Macs that wouldn't otherwise be able to support a SuperDrive; and power-supply replacements that let you add even more devices to your Mac or use more power-hungry ones.

Plan for the Long Term

Because upgrades often involve spending hundreds—perhaps thousands—of dollars, try to foresee your needs over the next several years. It's easy to buy more performance than you need in the quest for having the latest and greatest. But it's also easy to buy lots of marginal upgrades that, over time, add up to more money than what you would have spent on a major upgrade to begin with.

There will always be a faster, more capable Mac just around the corner—this is probably the one immutable law of computing. But you can keep up with the Joneses without going broke by thinking ahead and choosing your upgrade strategy wisely. **m**

Their selling price for the same machine was about \$1700.

3. Sell through a service.

Pros: As with a dealer, you avoid the headaches of selling it yourself. And an intermediary, such as BCE or the American Computer Exchange (800/786-0717), lets you set your selling price.

Cons: Intermediaries charge a fee to list your Mac (BCE charges \$25), and exact a commission (BCE takes 20 percent) when it's sold.

And Then There Are Taxes

Once the Mac is sold and the money is in your pocket, you still may have another hurdle: taxes. If your business sells a Mac for more than the original cost (minus depreciation), there's a taxable gain. If the business sells the computer for less than the original cost, the business can declare a loss.

Individuals lose both ways. If you sell the Macintosh for more

than you paid, you have a taxable gain. If you sell it for less than its market value, you have a personal loss that you cannot claim on your income tax.

How to Set Your Price

Buyers and sellers have to ask the same question: how do you know what the right price is for a used Mac? You don't have to be an economics whiz to know that used Mac prices are driven by the laws of supply and demand.

1. Find out what the going rate is. Scan the prices in want ads; even better, check the weekly listings published by BCE (available in many computer newspapers and online services such as CompuServe and Delphi). You can also obtain these prices at no fee via fax (617/542-8849).

2. Get an appraisal. For \$10, BCE will appraise your system and tell you what the fair market price should be.

System Upgrades

Compact



Plus



SE



SE/30



Classic



Classic II
(Performa 200)



Color Classic

General

Date introduced	January 1986	March 1987	January 1989	October 1990	October 1991	February 1993
Status	discontinued	discontinued	discontinued	discontinued	available	available
Overall speed *	0.8	1.0	3.2	1.0	1.8	1.7
Price †	\$400	\$575	\$1150	\$650	\$1079	\$1389

Processor

Type	68000	68000	68030	68000	68030	68030
Speed	8MHz	8MHz	16MHz	8MHz	16MHz	16MHz
Math coprocessor	not supported	not supported	included	not supported	via add-on board	optional
Paged Memory Management Unit	not supported	not supported	included	not supported	included	included

System Memory

Soldered logic-board RAM	none	none	none	1MB	2MB	4MB
Maximum RAM	4MB	4MB	128MB	4MB	10MB	10MB
SIMM type	30-pin	30-pin	30-pin	30-pin	30-pin	30-pin
Minimum SIMM speed	150ns	150ns	120ns	120ns	100ns	100ns

Built-in Video

Included	built-in monitor	built-in monitor	built-in monitor	built-in monitor	built-in monitor	built-in monitor
Standard VRAM	none	none	none	none	none	256K
Maximum VRAM	none	none	none	none	none	512K
Standard colors *	B&W	B&W	B&W	B&W	B&W	256 **
Maximum colors *	B&W	B&W	B&W	B&W	B&W	32,768
Maximum monitor size (8-bit)	NA	NA	NA	NA	NA	NA
Maximum monitor size (16-bit)	NA	NA	NA	NA	NA	NA

Number of Slots and Ports

NuBus slots	0	0	0	0	0	0
Processor Direct Slots (PDS)	0	1	1	0	0	1
Cache slots	0	0	0	0	0	0
Sound-in ports	0	0	0	0	1	1

Storage Devices

Maximum hard drive transfer rate	260 KBps	660 KBps	1400 KBps	660 KBps	1100 KBps	1100 KBps
Maximum internal hard drives	1	1	1	1	1	1
Accessible drive bays	0	0	0	0	0	0
SuperDrive	no	yes ***	yes	yes	yes	yes

System Upgrade

Replacement logic-board options	none	none	none	Classic II	none	none
Macworld's recommended upgrade strategy	replace with Color Classic or LC III	replace with Color Classic or LC III, or add SuperDrive	install accelerator board; slot-expansion chassis if needed	replace with Color Classic or LC III	replace with Color Classic or other Mac	install VRAM or accelerator board

NA = not applicable.

* Numbers indicate how many times as fast a particular Mac is in comparison to the Classic.

† Prices for discontinued models are based on typical resale values as of March 1993. Prices

for current models vary from base to high-end configurations. Prices listed for models with Performa equivalents are for standard Mac models only.

* Some models use a 68LC040, which does not

include a math coprocessor.

§ A Performa 600 has no math coprocessor, and the 600's cache is optional.

" Some models come with 4MB of on-board RAM and can be expanded to 132MB.

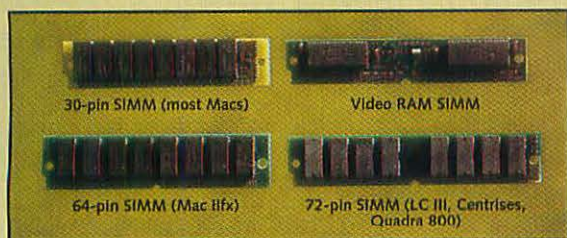
Guide to Memory

General Guidelines

Almost every Mac has its own permissible memory configurations as well as particular memory bank positions. The illustrations in this pullout guide pinpoint the location of memory banks on all desktop Macs (from the Plus to the Quadras). Beside the illustrations are the memory specs for each Mac, including any special RAM requirements, video RAM options (if supported), and a table showing which SIMMs are needed and how they should be placed to achieve at least 4MB of memory (the minimum RAM recommended for System 7). (The RAM configuration tables don't include 16MB or larger SIMMs, which are hard to get and expensive.)

Whatever Mac you have, the following rules apply to installing memory:

1. Each RAM slot can accommodate one SIMM. All slots in a bank must be either completely filled or completely empty (as shown below in the close-up of an SE/30's banks configured for 4MB).
2. Unless otherwise noted, if you fill only one bank, fill Bank A.
3. All SIMMs in a bank must be of the same capacity (you can't put one 4MB SIMM and one 2MB SIMM in the same bank).
4. Unless otherwise noted, if you use SIMMs of different capacities in each bank (for example, 4MB SIMMs in Bank A, 2MB SIMMs in Bank B), always put the higher-capacity SIMMs in Bank A.
5. Unless otherwise noted, use standard 30-pin Mac SIMMs.



DRAM:

Legend:

- = Bank A ■ = Bank B ■ = VRAM
■ = Bank C ■ = Bank D

COMPACT MACS

Plus, SE

Soldered logic-board RAM: none. Maximum RAM: 4MB. SIMM capacities supported: 256K, 1MB. Minimum SIMM speed: 150ns. RAM configurations: Two banks with two slots each.

Total RAM	Bank A	Bank B
4MB	2 × 1MB	2 × 1MB

Notes: For most SEs (those that have a memory jumper), if you use SIMMs of different capacities in each bank, put the higher-capacity SIMMs in Bank B. If you fill only one bank, it must be Bank B. Early SEs use a small resistor (labeled R35) instead of a memory jumper; for these SEs, put the higher-capacity SIMMs in Bank A.

SE/30

Soldered logic-board RAM: none. Maximum RAM: 128MB. SIMM capacities supported: 256K, 1MB, 4MB, 8MB, 16MB. Minimum SIMM speed: 120ns. RAM configurations: Two banks with two slots each.

Total RAM	Bank A	Bank B
4MB	4 × 1MB	empty
5MB	4 × 1MB	4 × 256K
8MB	4 × 1MB	4 × 1MB
16MB	4 × 4MB	empty

Total RAM	Bank A	Bank B
17MB	4 × 4MB	4 × 256K
20MB	4 × 4MB	4 × 1MB
32MB	4 × 4MB	4 × 4MB
32MB	4 × 8MB	empty
33MB	4 × 8MB	4 × 256K
36MB	4 × 8MB	4 × 1MB
48MB	4 × 8MB	4 × 4MB
64MB	4 × 8MB	4 × 8MB

Notes: Memory is limited to 8MB if the Mac isn't running in 32-bit mode (requires Mode32 software or Apple's 32-Bit System Enabler).

Classic

Soldered logic-board RAM: 1MB. Maximum RAM: 4MB. SIMM capacities supported: 256K, 1MB. Minimum SIMM speed: 120ns. RAM configurations: One bank (on an add-on board) with two slots (on memory-expansion board).

Total RAM	Bank A
4MB	2 × 1MB

Notes: Uses a board for memory expansion; board has 1MB of RAM soldered on it plus two slots for additional memory.

Classic II (Performa 200)

Soldered logic-board RAM: 2MB. Maximum RAM: 10MB. SIMM capacities supported: 1MB, 2MB, 4MB. Minimum SIMM speed: 100ns. RAM configurations: One bank with two slots.

Total RAM	Bank A
4MB	2 × 1MB
6MB	2 × 2MB
10MB	2 × 4MB

Notes: If the Mac isn't running in 32-bit mode, memory is limited to 8MB.

Color Classic

Soldered logic-board RAM: 4MB. Maximum RAM: 10MB. SIMM capacities supported: 1MB, 2MB, 4MB. Minimum SIMM speed: 100ns. RAM configurations: One bank with two slots.

Total RAM	Bank A
6MB	2 × 1MB
8MB	2 × 2MB
10MB	2 × 4MB

Notes: Although adding two 4MB SIMMs brings the total amount of RAM to 12MB, the Color Classic can address only up to 10MB. VRAM: 256K on-board, expandable to 512K.

LOW-COST MACS

LC, LC II (Performa 400, 405, 430)

Soldered logic-board RAM: 2MB (LC), 4MB (LC II). Maximum RAM: 10MB. SIMM capacities supported: 1MB, 2MB, 4MB. Minimum SIMM speed: 100ns. RAM configurations: One bank with two slots.

LC		LC II (Performa 400)	
Total RAM	Bank A	Total RAM	Bank A
4MB	2 × 1MB	6MB	2 × 1MB
6MB	2 × 2MB	8MB	2 × 2MB
10MB	2 × 4MB	10MB	2 × 4MB

Upgrades

Notes: Although adding two 4MB SIMMs to the LC II brings the total amount of memory to 12MB, the LC II can address only up to 10MB. **VRAM:** 256K on-board, expandable to 512K by replacing the 256K VRAM SIMM with a 512K VRAM SIMM.

LC III (Performa 450)

Soldered logic-board RAM: 4MB. **Maximum RAM:** 36MB. **SIMM capacities supported:** 1MB, 2MB, 4MB, 8MB, 16MB, 32MB. **Minimum SIMM speed:** 80ns. **RAM configurations:** One bank with one slot.

Total RAM	Bank A
5MB	1MB
6MB	2MB
8MB	4MB
12MB	8MB

Notes: Uses DOS-style 72-pin SIMMs. **VRAM:** 512K on-board; can be upgraded to 768K. LC and LC II owners with a 512K VRAM SIMM who upgrade to an LC III can use the 512K VRAM SIMM in the LC III (for 1MB total), but the amount of addressable VRAM remains 768K. Composite SIMMs not recommended.

MIDRANGE MACS

II, IIx

Soldered logic-board RAM: none. **Maximum RAM:** 68MB (Mac II); 128MB (Mac IIx). **SIMM capacities supported:** 256K, 1MB, 4MB, 8MB, 16MB. **Minimum SIMM speed:** 120ns. **RAM configurations:** Two banks with four slots each.

Total RAM	Bank A	Bank B
4MB	4 × 1MB	empty
5MB	4 × 1MB	4 × 256K
8MB	4 × 1MB	4 × 1MB
16MB	4 × 4MB	empty
17MB	4 × 4MB	4 × 256K
20MB	4 × 4MB	4 × 1MB
32MB	4 × 4MB	4 × 4MB
32MB	4 × 8MB	empty
33MB	4 × 8MB	4 × 256K
36MB	4 × 8MB	4 × 1MB
48MB	4 × 8MB	4 × 4MB
64MB	4 × 8MB	4 × 8MB

Notes: The Mac II can't address more than 68MB of memory regardless of how much is installed. For a II without a SuperDrive upgrade, if you use SIMMs of different capacities in each bank and you're using SIMMs of 4MB or greater capacity, put the higher-capacity SIMMs in Bank B. The II requires that 16MB SIMMs be PAL SIMMs; the IIx requires that 4MB and 16MB SIMMs be PAL SIMMs. Memory is limited to 8MB if the Mac isn't running in 32-bit mode.

IIcx

Soldered logic-board RAM: none. **Maximum RAM:** 128MB. **SIMM capacities supported:** 256K, 1MB, 4MB, 8MB, 16MB. **Minimum SIMM speed:** 120ns. **RAM configurations:** Two banks with four slots each.

Total RAM	Bank A	Bank B
4MB	4 × 1MB	empty
5MB	4 × 1MB	4 × 256K
8MB	4 × 1MB	4 × 1MB
16MB	4 × 4MB	empty
17MB	4 × 4MB	4 × 256K
20MB	4 × 4MB	4 × 1MB
32MB	4 × 4MB	4 × 4MB

Total RAM	Bank A	Bank B
32MB	4 × 8MB	empty
33MB	4 × 8MB	4 × 256K
36MB	4 × 8MB	4 × 1MB
48MB	4 × 8MB	4 × 4MB
64MB	4 × 8MB	4 × 8MB

Notes: Memory is limited to 8MB if the Mac is not running in 32-bit mode.

IIci

Soldered logic-board RAM: none. **Maximum RAM:** 128MB. **SIMM capacities supported:** 256K, 512K, 1MB, 2MB, 4MB, 8MB, 16MB. **Minimum SIMM speed:** 80ns. **RAM configurations:** Two banks with four slots each.

Total RAM	Bank A	Bank B
4MB	4 × 512K	4 × 512K
4MB	4 × 1MB	empty
5MB	4 × 1MB	4 × 256K
6MB	4 × 1MB	4 × 512K
8MB	4 × 1MB	4 × 1MB
8MB	4 × 2MB	empty
9MB	4 × 2MB	4 × 256K
10MB	4 × 2MB	4 × 512K
12MB	4 × 2MB	4 × 1MB
16MB	4 × 2MB	4 × 2MB
16MB	4 × 4MB	empty
17MB	4 × 4MB	4 × 256K
18MB	4 × 4MB	4 × 512K
20MB	4 × 4MB	4 × 1MB
24MB	4 × 4MB	4 × 2MB
32MB	4 × 4MB	4 × 4MB
32MB	4 × 8MB	empty
33MB	4 × 8MB	4 × 256K
34MB	4 × 8MB	4 × 512K
36MB	4 × 8MB	4 × 1MB
40MB	4 × 8MB	4 × 2MB
48MB	4 × 8MB	4 × 4MB
64MB	4 × 8MB	4 × 8MB

Notes: If you install SIMMs of different capacities in each bank and you use the on-board video, put the higher-capacity SIMMs in Bank B. **VRAM:** Uses system RAM and is not upgradable.

IIsi

Soldered logic-board RAM: 1MB. **Maximum RAM:** 65MB. **SIMM capacities supported:** 256K, 512K, 1MB, 2MB, 4MB, 16MB. **Minimum SIMM speed:** 100ns. **RAM configurations:** One bank with four slots.

Total RAM	Bank A
5MB	4 × 1MB
9MB	4 × 2MB
17MB	4 × 4MB

Notes: With System 7 virtual memory enabled, only 12MB of RAM may be addressed. **VRAM:** Uses system RAM and is not upgradable.

IIvx (Performa 600)

Soldered logic-board RAM: 4MB. **Maximum RAM:** 68MB. **SIMM capacities supported:** 256K, 1MB, 2MB, 4MB, 8MB, 16MB. **Minimum SIMM speed:** 80ns. **RAM configurations:** One bank with four slots each.

Total RAM	Bank A
5MB	4 × 256K
8MB	4 × 1MB
12MB	4 × 2MB

Total RAM	Bank A
20MB	4 × 4MB
36MB	4 × 8MB

VRAM: 512K on-board; expandable to 1MB with two 256K VRAM SIMMs.

Centris 610

Soldered logic-board RAM: 4MB. Maximum RAM: 68MB. SIMM capacities supported: 4MB, 8MB, 16MB, 32MB. Minimum SIMM speed: 80ns. RAM configurations: Two banks with one slot each.

Total RAM	Bank A	Bank B
8MB	4MB	empty
12MB	4MB	4MB
12MB	8MB	empty
16MB	8MB	4MB
20MB	8MB	8MB

Notes: Uses DOS-style 72-pin SIMMs (not the common 30-pin Mac or DOS SIMMs). VRAM: 512K on-board, expandable to 1MB. Composite SIMMs not recommended.

Centris 650

See the memory specifications for the Quadra 800; the computers' memory configurations are the same, except that the 650's minimum SIMM speed is 80ns and the 800's is 70ns.

HIGH-END MACS

Ilfx

Soldered logic-board RAM: none. Maximum RAM: 128MB. SIMM capacities supported: 1MB, 4MB, 8MB, 16MB. Minimum SIMM speed: 80ns. RAM configurations: Two banks with four slots each.

Total RAM	Bank A	Bank B
4MB	4 × 1MB	empty
8MB	4 × 1MB	4 × 1MB
16MB	4 × 4MB	empty
20MB	4 × 4MB	4 × 1MB
32MB	4 × 4MB	4 × 4MB
32MB	4 × 8MB	empty
36MB	4 × 8MB	4 × 1MB
48MB	4 × 8MB	4 × 4MB
64MB	4 × 8MB	4 × 8MB

Notes: Uses 64-pin SIMMs (the same as for LaserWriter IITX).

Quadra 700

Soldered logic-board RAM: 4MB. Maximum RAM: 64MB. SIMM capacities supported: 1MB, 4MB, 8MB, 16MB. Minimum SIMM speed: 80ns. RAM configurations: One bank with four slots.

Total RAM	Bank A
8MB	4 × 1MB
20MB	4 × 4MB
36MB	4 × 8MB

Notes: 16MB SIMMs must be low-profile SIMMs. Using four 16MB SIMMs brings the total RAM to 68MB, but the Quadra 700 can address only 64MB of it. VRAM: 512K on-board, expandable to 2MB with four 256K VRAM SIMMs. VRAM must be added in two-SIMM increments.

Quadra 900, 950

Soldered logic-board RAM: none. Maximum RAM: 256MB. SIMM capacities supported: 1MB, 4MB, 8MB, 16MB. Minimum SIMM speed: 80ns. RAM configurations: Four banks with four slots each.

Total RAM	Bank A	Bank B	Bank C	Bank D
4MB	4 × 1MB	empty	empty	empty
8MB	4 × 1MB	4 × 1MB	empty	empty
12MB	4 × 1MB	4 × 1MB	4 × 1MB	empty
16MB	4 × 1MB	4 × 1MB	4 × 1MB	4 × 1MB
16MB	4 × 4MB	empty	empty	empty
20MB	4 × 4MB	4 × 1MB	empty	empty
24MB	4 × 4MB	4 × 1MB	4 × 1MB	empty
28MB	4 × 4MB	4 × 1MB	4 × 1MB	4 × 1MB
32MB	4 × 4MB	4 × 4MB	empty	empty
32MB	4 × 8MB	empty	empty	empty
36MB	4 × 4MB	4 × 4MB	4 × 1MB	empty
36MB	4 × 8MB	4 × 1MB	empty	empty
40MB	4 × 4MB	4 × 4MB	4 × 1MB	4 × 1MB
40MB	4 × 8MB	4 × 1MB	4 × 1MB	empty
44MB	4 × 8MB	4 × 1MB	4 × 1MB	4 × 1MB
48MB	4 × 4MB	4 × 4MB	4 × 4MB	empty
48MB	4 × 8MB	4 × 4MB	empty	empty
52MB	4 × 4MB	4 × 4MB	4 × 4MB	4 × 1MB
52MB	4 × 8MB	4 × 4MB	4 × 1MB	empty
56MB	4 × 8MB	4 × 4MB	4 × 1MB	4 × 1MB
64MB	4 × 4MB	4 × 4MB	4 × 4MB	4 × 4MB
64MB	4 × 8MB	4 × 4MB	4 × 4MB	empty
64MB	4 × 8MB	4 × 8MB	empty	empty
68MB	4 × 8MB	4 × 4MB	4 × 4MB	4 × 1MB
68MB	4 × 8MB	4 × 8MB	4 × 1MB	empty
72MB	4 × 8MB	4 × 8MB	4 × 1MB	4 × 1MB
80MB	4 × 8MB	4 × 4MB	4 × 4MB	4 × 4MB
80MB	4 × 8MB	4 × 8MB	4 × 4MB	empty
84MB	4 × 8MB	4 × 8MB	4 × 4MB	4 × 1MB
96MB	4 × 8MB	4 × 8MB	4 × 4MB	4 × 4MB
96MB	4 × 8MB	4 × 8MB	4 × 8MB	empty
100MB	4 × 8MB	4 × 8MB	4 × 8MB	4 × 1MB
112MB	4 × 8MB	4 × 8MB	4 × 8MB	4 × 4MB
128MB	4 × 8MB	4 × 8MB	4 × 8MB	4 × 8MB

VRAM: 1MB on-board; expandable to 2MB with four 256K VRAM SIMM. VRAM SIMMs must be added in pairs.

Quadra 800

Soldered logic-board RAM: 8MB. Maximum RAM: 136MB. SIMM capacities supported: 4MB, 8MB, 16MB, 32MB. Minimum SIMM speed: 70ns. RAM configurations: Four banks with one slot each.

Total RAM	Bank A	Bank B	Bank C	Bank D
12MB	4MB	empty	empty	empty
16MB	4MB	4MB	empty	empty
16MB	8MB	empty	empty	empty
20MB	4MB	4MB	4MB	empty
20MB	8MB	4MB	empty	empty
24MB	4MB	4MB	4MB	4MB
24MB	8MB	4MB	4MB	empty
24MB	8MB	8MB	empty	empty
28MB	8MB	8MB	4MB	empty
28MB	8MB	4MB	4MB	4MB
32MB	8MB	8MB	4MB	4MB
32MB	8MB	8MB	8MB	empty
36MB	8MB	8MB	8MB	4MB
40MB	8MB	8MB	8MB	8MB

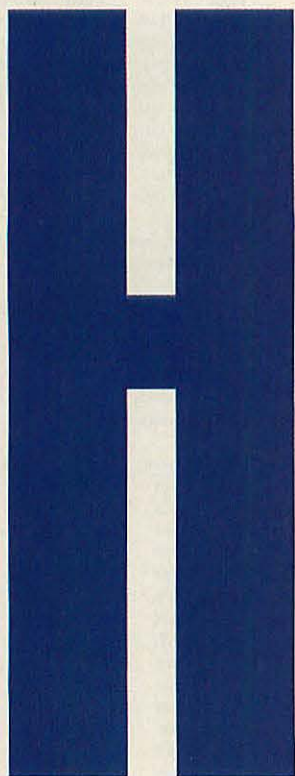
Notes: Uses DOS-style 72-pin SIMMs (not the common 30-pin Mac or DOS SIMMs). Some Centris 650s have 4MB of soldered logic-board RAM (for a maximum of 132MB of RAM); subtract 4MB from all totals for such a model. VRAM: 512K on-board, expandable to 1MB. Composite SIMMs not recommended.

MACWORLD

Expanding a Compact Mac

Prolong the life of your Plus, Classic series, or SE series Mac

by Suzanne Stefanac



and-me-downs. Outdated curiosities. It's easy to dismiss older compact Macs as little more than antiquated appliances. Unless, of course, you need to use one. A Plus or even an SE/30 might lack the power and suavity of Apple's newer offerings, but many thousands of them get the job done each day. I know. Back in the dawn of desktop publishing, I helped edit the first magazine put out on the only Macintosh around—a 128K with a single floppy drive and no hard drive. Memories of those days made several years of publishing a 16-page newsletter on an unaccelerated 1MB Plus seem like a cinch. (OK, scrolling TIFF files in PageMaker was a tiny bit aggravating.)

I know scientists and educators who keep large flat-file databases on SEs. One researcher I've interviewed runs sophisticated statistical analyses on an SE/30. A cartoonist friend builds whimsical animations on his Plus. My boyfriend, Alan, uses my old Plus to lay out floor plans for his theater sets; this *is* CAD, albeit not rocket science. Like many other users of compact Macs, he doesn't complain because this is the machine he's familiar with (my ILCi is generally in use). But there's always room for improvement.

Still, upgrading a compact Mac involves some painful choices. These Macs were not designed, for the most part, to be upgraded. Sure, you can add memory and maybe an expansion board. But that's about it. If you're seriously constrained by your compact Mac's limitations, you should graduate to an LC or midrange Mac that offers wider video and expansion options, plus an upgrade path for the long

term. Mac prices are getting low enough, even for those on a budget. If you decide that your compact Mac is basically all right, but you'd like to see improvements in one or two areas, then selective upgrading makes sense if the price is right. If you've outgrown your Mac and your budget is very tight, an upgrade may be your only option.

Let's first look at some general upgrade issues and then take a Mac-by-Mac look at specific options and recommendations. For information about where to buy products mentioned in this article, see "Buyers' Guide to Upgrades."

All Compact Macs

THE UPGRADE OPTIONS FOR COMPACT Macs vary based on the model, but a few options are common to all.

Memory The quickest, cheapest fix for a sluggish system is to add memory. Memory needs depend on system software and the type and number of applications you run. System 7 is more frustrating than valuable if you have fewer than 4MB of RAM; and if you want to have more than one sizable application open at a time, 8MB of RAM is a must. Which brings us to the Plus, SE, and Classic—these machines can access only 4MB of RAM because of their memory architecture. Fortunately, many 68030- and 68040-based accelerators have slots that let you add as much as 64MB of RAM; but if you add this memory, the RAM on the logic board is ignored. (These accelerators bypass the Mac's memory architecture in favor of their own, allowing the larger memory capacity.)

Also, because the Plus, SE, and Classic lack a Paged Memory Management Unit (PMMU), they do not support virtual memory, which allows a processor to treat part of a hard drive as though it were RAM, thus providing access to additional memory. Does this mean that Plus, SE, and Classic owners can't use virtual memory? No. They can if they add an accelerator with a PMMU and buy Compact Virtual 3.0 (\$99, from Connectix Corporation), a software workaround that allows such Macs to support virtual memory and thus access up to 12MB on a hard drive as if it were RAM (under either System 6 or System 7). Many vendors supply Compact Virtual with their accelerators. Be sure that a new accelerator is not based on a 68EC030 processor, since these processors do not contain PMMU circuitry and thus, even with Compact Virtual, you will be unable to access virtual memory. Likewise, no 68040-based accelerator can support virtual memory, even with Compact Virtual.

Why would you want virtual memory? If you work with applications or files that store large amounts of data in RAM, such as low-end page-layout programs, virtual memory is an alternative to loading up your system with RAM. Be forewarned, however, that virtual memory is much slower than actual system RAM.

Because the SE/30, Classic II, and Color Classic are based on the 68030, which has a built-in PMMU, they natively support virtual memory.

Math Coprocessing A math coprocessor (also called an FPU, for floating-point unit) performs certain calculations that

would otherwise bog down the processor—for example, operations used in CAD, modeling, and scientific analysis. If your work involves these calculations, buy a math coprocessor. However, almost no business spreadsheets use these calculations, so don't think you'll accelerate Excel if you buy a math coprocessor. The SE, Plus, and Classic do not support math coprocessors. The SE/30 includes a math coprocessor, and the Classic II has a slot for a third-party add-on coprocessor board. Apple offers an optional, \$79 math coprocessor for the Color Classic.

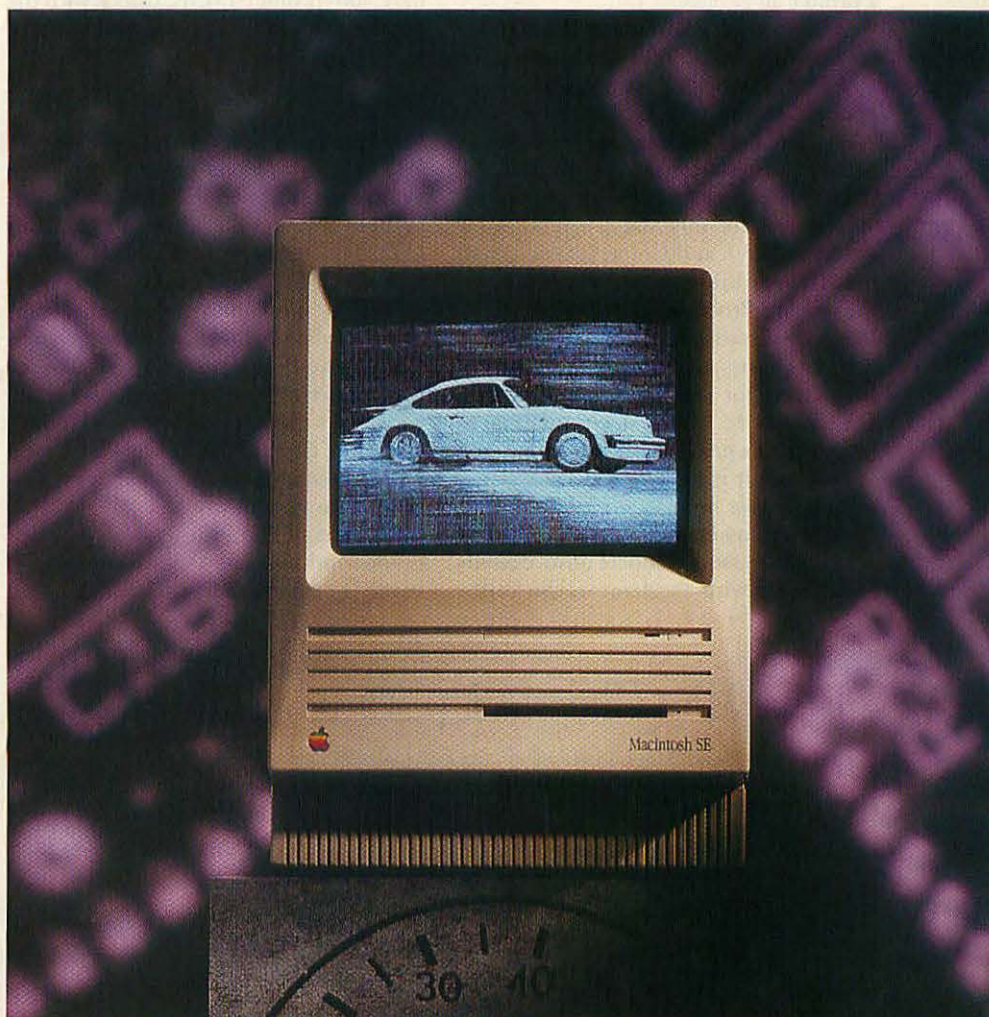
Storage If you can recall the whining sound a 128K Mac made when you swapped floppy disks, you know there was a time when 400K was as much storage as you could get. Now a Classic can handle an internal hard drive that holds as much as 120MB—and MicroNet offers SE owners a \$3495 drive that holds 1GB. Of course, you can hook up just about any hard drive to the Mac's SCSI port.

Remember that older Macs can't support the industry's highest transfer rates;

your data will travel at the same old SCSI rates your Mac is used to. That means you don't need to worry about getting a fast drive—any modern drive will do.

Video Display For those tired of squinting into a 9-inch universe, vendors offer many video-display options for compact Macs. For all but the Classic II, you can buy a video-display board to drive an external monitor. The Color Classic and SE/30 support 8-bit or better color monitors. Video-display boards for the Color Classic—which include any boards designed for the LC series—can display up to 24-bit color on external monitors. The Plus, SE, SE/30, and Classic support black-and-white display.

Port Expansion The Axion Switch (\$159) from Axion lets you switch between four serial devices, and the Hurdler SCSI Serial Expansion (\$695) from Creative Solutions provides a more serious option (complete with two coprocessors) that lets you access up to six serial devices simultaneously. The latter should be a boon to bulletin board system operators,



PHOTOGRAPH BY PAUL HANZ MOORE / SCREEN IMAGE BY RON PERRY

who need to run additional modems and a printer all at once.

Acceleration Installing third-party accelerators can be a pain or a snap. Plus and Classic accelerators must somehow connect to the original processor, and some schemes are more successful than others. (Installation isn't a concern for Classic II owners, because there are no accelerators for this Mac.) Upgrades for the SE, SE/30, and Color Classic install much more easily; you just snap them into the waiting Processor Direct Slot (PDS). Because installation can be so tricky, many vendors of these upgrades will install them for a minimal cost or for free. Unless you've installed circuit boards before, have a pro do it—you'd be amazed at how easy it is to ruin an accelerator, a logic board, or both.

Also, many memory boards and some math coprocessors compete unsuccessfully for space with accelerators. So-called

high-profile SIMMs are taller than ordinary, low-profile SIMMs. Check with the accelerator vendor about possible space incompatibilities.

Plus

Strengths A sentimental favorite, the Plus is quiet and light.

Weaknesses The Plus has no NuBus or PDS slot and no Apple Desktop Bus (ADB) port. It's limited to 4MB of system RAM. You need an accelerator with a PMMU and Compact Virtual to support virtual memory or extra system RAM. The Plus lacks a SuperDrive, an internal hard drive (although you could add one), a math coprocessor, and sound-recording circuitry. Its power supply and its SCSI technology often are buggy. System 7 runs very slowly.

Strategies The Plus has very few upgrade options and is, fundamentally, hardly worth upgrading. Use it as is, sell

it, or give it to charity. Consider buying an LC III to replace it, or if you like the all-in-one approach, check out the Color Classic. If you can't bear to part with your Plus, here are some options to consider.

Acceleration The Brainstorm Accelerator (\$249) from Brainstorm Products gets high praise for enhanced speed and dependability from user groups and those who post commentaries on online services. (Because it is based on a 16MHz 68000 processor, this two-component upgrade—a processor and a Brainstorm Bus Accelerator chip—was not included in our accelerator tests, which we limited to 68030- or 68040-based accelerators.)

Power Supply If you're determined to accelerate your Plus, you might also consider beefing up its power supply. Total Systems rebuilds Mac Plus power supplies using heavy-duty components.

Video Display If you want to add a larger monochrome monitor, you have a few choices: display systems from Lapis Technologies or the monitor that comes with MicroMac Technology's case-and-accelerator upgrade (\$998).

SE

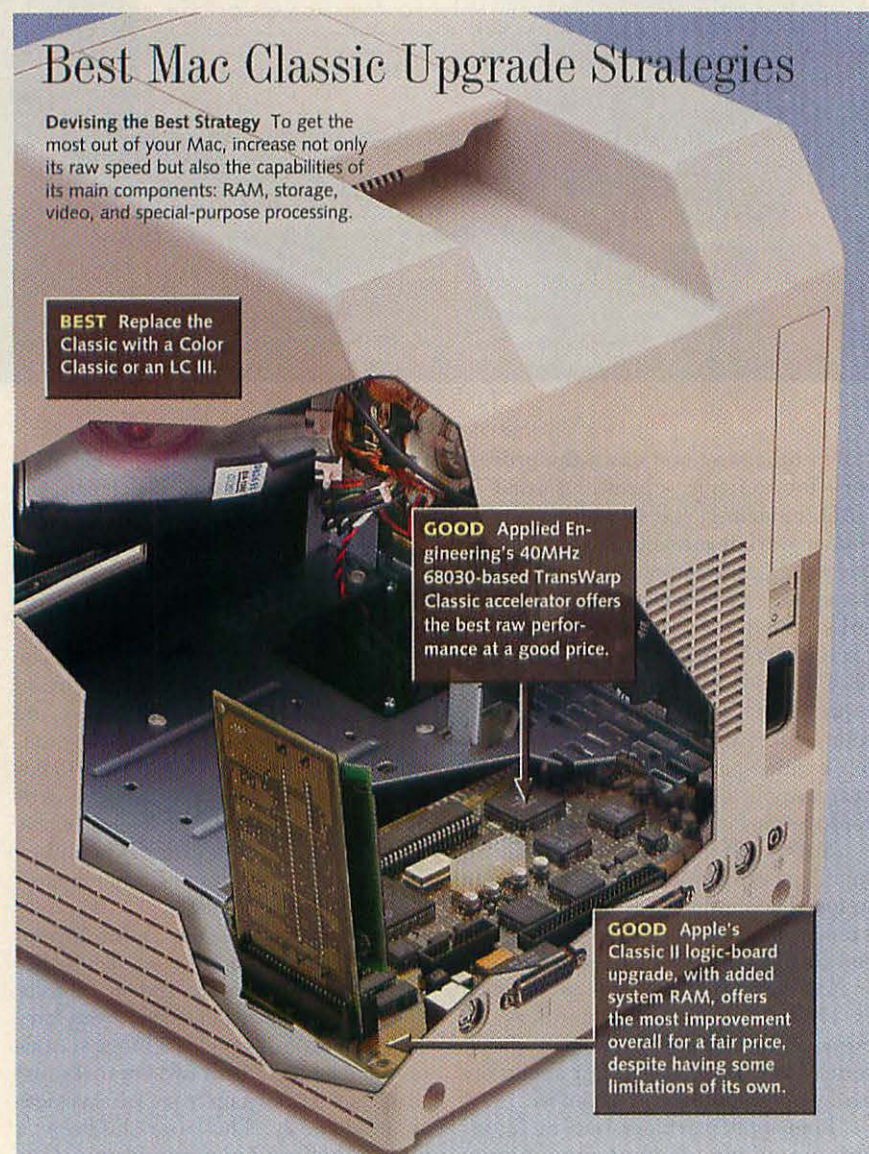
Strengths The SE's one PDS slot allows easy installation of, for example, an accelerator board or a large-screen video-display board. SEs built after August 1989 have 1.44MB SuperDrives. The SE includes two ADB ports.

Weaknesses The SE has a limit of 4MB for system RAM and has no math coprocessor or sound-recording circuitry. It can't accept PDS boards designed for the SE/30, and the SE requires a ROM upgrade to support color QuickDraw. The fan can be noisy.

Strategies Buy an accelerator if you need improved performance, but don't go for the top of the line, because a new Mac would be cheaper.

Acceleration A stock SE comes with a 68000 processor running at 8MHz. If you add an accelerator with a 25MHz 68030, you perform two key improvements: first, you speed up the processor's internal clock by a factor of three, allowing the computer to process more instructions in a given amount of time; second, you replace the SE's hybrid 16-bit and 32-bit processor with a true 32-bit processor that, in general, is faster and more efficient. You get roughly the same computing power as a Mac IIci—yet 25MHz 68030 accelerators cost as little as \$400 in terms of street price, much less than even a used IIci. Adding an accelerator also adds support for virtual memory and large-memory addressing.

When buying an accelerator board for the SE, decide which is more impor-



Best Mac SE Upgrade Strategies

tant: performance or price. A 25MHz 68030 accelerator may seem modest when compared with racier cousins, but for those on a budget, a \$449 Novy Systems Quik30 25MHz board (without a math coprocessor) will speed up most tasks by four to six times.

If you're really looking for some lightning action, Macworld Lab tests show that Applied Engineering's Trans-Warp SE 40MHz (\$1198) board came in slightly ahead of three 50MHz upgrades: Extreme Systems' Vandal 50MHz (\$999) and two Total Systems boards—the Gemini Integra 50MHz (\$1089) and the Gemini Ultra SE 50MHz (\$979). (All prices include a math coprocessor; expect Applied Engineering's street prices to be closer to Total Systems'.) Any of these accelerators will grant your SE access to System 7 and just about any application that doesn't require color, but the Gemini Integra, with its built-in monochrome video capabilities supporting displays up to 15 inches, is the best overall processor-upgrade deal.

SuperDrive The 1.44MB floppy is becoming the standard Macintosh floppy, which means you need a SuperDrive if you exchange disks with other people. Apple's SE/30 logic-board upgrade for the SE is no longer available, but you can still get the enhanced ROM if you buy Apple's Macintosh FDHD Upgrade Kit (\$285 internal and \$329 external).

Several companies offer external SuperDrive-compatible floppy drives. Applied Engineering's AEHD Plus Drive (\$449) relies on software and firmware routines that allow your SE to read 400K, 800K, and 1.44MB floppies. Likewise, the PLI SuperFloppy drive (\$399) can read all three, but the PLI TurboFloppy (\$359) reads only 1.44MB floppies.

SE/30

Strengths The SE/30 has a PDS slot, two ADB ports, a built-in math coprocessor, and stereo sound output. Color QuickDraw in ROM allows display of gray-scale or color with an appropriate video-display board.

The SE/30 runs three to four times faster than the Classic II, even though both have a 68030 processor that runs at 16MHz. The primary reason for the better speed lies in the width of the data path between the processor and memory; an SE/30 can transfer data to and from its memory in 32-bit chunks, while a Classic II is limited to 16-bit chunks. In terms any commuter can appreciate, an SE/30's internal data freeway has twice as many lanes as a Classic II's. Because the 68030 has a PMMU, the SE/30 natively supports virtual memory.

Devising the Best Strategy To get the most out of your Mac, increase not only its raw speed but also the capabilities of its main components: RAM, storage, video, and special-purpose processing.

BEST Replace the SE with a Color Classic or an LC III.

BEST A 1.44MB SuperDrive (available from several vendors) ensures that you can exchange data with any Macintosh user, and even DOS users.

MAYBE A 25MHz 68030-based accelerator (from any vendor) with extra system RAM offers sufficiently more raw performance at a decent price.

Weaknesses The SE/30's so-called dirty ROM limits system RAM to 8MB (Mode32, software developed by Connectix, expands this to 128MB). The SE/30 has no sound-recording circuitry.

Strategies The best improvement is to get access to more RAM, which means making sure you've installed Mode32 or, if you're running System 7.1, Apple's 32-Bit System Enabler Extension.

Memory Because the SE/30's 68030 processor has a built-in PMMU, the SE/30 can run virtual memory without additional hardware. In 24-bit mode (the default setting), the SE/30 addresses up to 13MB of virtual memory. For System 7.0, Apple has licensed Mode32, a Connectix utility that lets an SE/30 running System 7 access up to 1GB of virtual memory by making the SE/30 run in 32-bit mode. If you use System 7.1, you can get Mode32 from online services.

Even under System 7, the SE/30's dirty ROM lets it access no more than 8MB of system RAM because it doesn't support full 32-bit addressing. With Mode32, the SE/30 runs in 32-bit mode, enabling it to address up to 128MB. How-

ever, some older programs will not run in 32-bit mode, and no accelerator boards based on the 68040 processor support Mode32 when used on the SE/30.

System 6 holdouts (you know who you are, and we know your machines are faster without System 7) needn't despair—memory addressing beyond 8MB on an SE/30 is within your grasp. Optima (\$175), another Connectix software utility, implements 32-bit addressing under System 6, letting you access up to 32MB of contiguous memory. Optima/128 (\$175) lets you access up to 128MB of application memory. Use Optima if you've added a lot of RAM to your SE/30 but don't want to upgrade to System 7 to be able to access it all.

Acceleration To push the SE/30 into a new league, you have to turn up the clock speed—DayStar Digital offers 33MHz, 40MHz, and 50MHz 68030 Universal PowerCaches—or opt for a 68040-based accelerator—the Fusion Data Systems TokaMac SX25, for instance. Check your wallet and to-do list and choose the DayStar 50MHz upgrade (\$999 with math coprocessor) for demanding tasks or the

DayStar 33MHz upgrade (\$549 with math coprocessor) for speeds that are twice those of a vanilla SE/30.

Video Display If you're contemplating doing 24-bit color work and don't want to spring for a new Mac just yet, Lapis Technologies offers two boards that will do the trick—the ProColor-Server II 24 (\$599) and 24x (\$699). The first comes with 1.5MB of video RAM (VRAM) to support monitors up to 16 inches; the second comes with 2MB of VRAM and can display 24-bit color on monitors up to 21 inches. Xceed Technology also offers a 24-bit color video-display board (\$799). Lapis and Mobius both offer boards that add 10BaseT and thin coax Ethernet connections to their video boards that support monochrome display on two-page monitors.

Slot Expansion Second Wave offers an expansion chassis with four or eight NuBus slots for an SE/30. The price for the Expanse isn't cheap (\$995 for four slots and \$1895 for eight slots), but if you want to have Ethernet, video capture, and 24-bit color on an already-paid-for SE/30, it could be a godsend.

Classic

Strengths It has a SuperDrive.

Weaknesses The Classic lacks an expansion slot, a math coprocessor, and sound-recording circuitry. It is also limited to 4MB of system RAM and can't run the Mode32 program that would allow it to address more. The power supply works only with the voltage of the country in which it is designed to be sold. A single ADB port limits the number of input devices you can connect.

Strategies If all you want is more speed, buy an inexpensive accelerator or the logic-board replacement from Apple. Otherwise, replace the Classic with a Color Classic or an LC III.

Logic-Board Replacement The surest path to a faster system is an official Apple logic-board upgrade, which for \$629 turns a Classic into a 16MHz 68030 Classic II. The Classic II is about twice as fast as a Classic and doesn't have the Classic's memory limits—the Classic II can address up to 10MB of RAM. Apple's upgrades include the latest ROMs and system software. The Classic II upgrade also gets you sound-recording circuitry and a microphone—no need to buy a MacroMind/Paracomp MacRecorder. But you may need to buy new SIMMs—Apple's upgrade includes only 2MB of RAM, plus the Classic II requires 100-nanosecond chips, while the original Classic used the slower 120ns variety. The dealer who installs your upgrade can tell you whether your existing SIMMs will work. However,

while you gain more RAM and better speed, you lose the ability to add a video-display or accelerator board.

Acceleration The Classic is a relatively slow, stripped-down machine that definitely benefits from acceleration. In Macworld Lab tests, Applied Engineering came out ahead—about eight times as fast—with its 40MHz 68030 TransWarp Classic (\$798, with a math coprocessor).

Classic II (Performa 200)

Strengths The 68030-based Classic II supports virtual memory and up to 10MB of system RAM. It has sound input and a slot for a math coprocessor or ROM upgrade. Its 32-bit QuickDraw lets the Classic II display color images in simulated shades of gray on its built-in mono-

chrome monitor. An external microphone allows 8-bit mono sound input.

Weaknesses The Classic II's 1-bit black-and-white display and lack of expansion slot make it difficult to take advantage of 32-bit color QuickDraw. No vendors offer video boards for the Classic II. Also, because pins on the 68030 processor are too close together, it is difficult to design reliable clip-on adapters for the Classic II, and to date there are no accelerators available. This is unfortunate because, like the LC, the Classic II must rely on a 16-bit data path, the main reason that this machine runs so much more slowly than the SE/30 with the same 16MHz 68030 processor.

Strategies Live with it, sell it, or replace it with an LC III or Color Clas-



Compact Macs: Replace or Accelerate?

SYSTEM PERFORMANCE (times as fast as a Classic)

Products are ordered by type of Mac (bold names) from fastest to slowest. Within each type, products are ordered from fastest to slowest.

Use the rankings under the heading Common to compare your Mac system against all Mac systems (both standard and accelerated) throughout this issue's upgrades articles, to help decide between replacing or accelerating your Mac. Use the rankings under Scientific only if you do rendering or scientific work.

= Fastest result in class for each test.

Common

We timed typical business tasks in Microsoft Excel and Word that use the Mac's processor, drives, and video display.

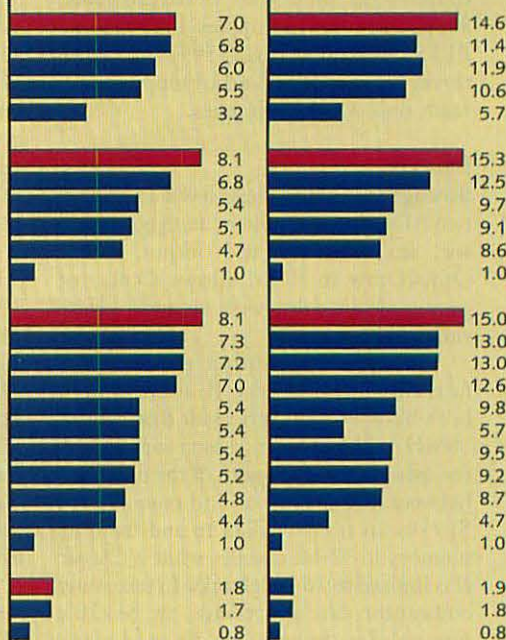
Scientific

We added to the common tasks several scientific calculations that use floating-point math.

Longer bars are better.

Longer bars are better.

Mac SE/30	
with DayStar PowerCache (50MHz 030)	7.0
with Fusion TokaMac* (25MHz EC040)	6.8
with DayStar PowerCache (40MHz 030)	6.0
with DayStar PowerCache (33MHz 030)	5.5
standard SE/30 (16MHz 030)	3.2
Mac Classic	
with Applied TransWarp Classic (40MHz 030)	8.1
with Total Gemini Classic (50MHz 030)	6.8
with Novy Quik30 Classic† (33MHz 030)	5.4
with Mobius 030 Accelerator (25MHz 030)	5.1
with Novy Quik30 Classic† (25MHz 030)	4.7
standard Classic (8MHz 68000)	1.0
Mac SE	
with Applied TransWarp SE (40MHz 030)	8.1
with Extreme Vandal† (50MHz 030)	7.3
with Total Gemini Ultra (50MHz 030)	7.2
with Extreme Vandal† (40MHz 030)	7.0
with Novy ImagePro [®] (33MHz 030)	5.4
with Extreme Vandal† (33MHz 030)	5.4
with MicroMac Multispeed (33MHz 030)	5.4
with Mobius MD031-PV (25MHz 030)	5.2
with Novy ImagePro [®] (25MHz 030)	4.8
with MicroMac Multispeed (25MHz 030)	4.4
standard SE (16MHz 68000)	1.0
Other Compact Macs	
standard Classic II (16MHz 030)	1.8
standard Color Classic (16MHz 030)	1.7
standard Plus (8MHz 68000)	0.8



*Also sold by Total Systems as the Magellan 040.

†Also sold by Novy's Systech division under the same name and by MacProducts USA as the RailGun.

sic. If you don't want a new machine, here are two options to consider.

Math Coprocessing If you use floating-point calculations, add a math coprocessor, such as Newer Technology's \$99 FPU-882 or Logica Research's \$99 LC And Classic II Math Coprocessor.

Video Display Classic II owners have two options to add an external monitor: a SCSI-based monochrome monitor, such as Sigma Designs' highly rated Power-Portrait (\$749); or a SCSI color video adapter, such as Aura Systems' Scuzzy-Graph (\$395 to \$695, depending on monitor type), Lapis's PowerBase II (\$699), or Radius's PowerView (\$599). But be warned: color SCSI adapters are slow (see "Expanding Your PowerBook," *Macworld*, February 1993).

Color Classic

Strengths A hybrid of the Classic II and the LC II, the Color Classic features a 10-inch built-in color monitor, PDS and math coprocessor expansion slots, two ADB ports, and support for up to 10MB of system RAM. The Color Classic's standard 256K of video RAM displays 8-bit color on its built-in monitor; this can be expanded to 512K to support 16-bit color. To save energy, the Screen Power Saver feature puts the monitor to sleep after a preselected idle time. The Color Classic also offers several sound options, including volume control buttons and a built-in microphone for 8-bit mono sound input. A major boon for upgrades is a case designed to provide easy access to the logic board—simply unlatch the clasps

MW

EDITORS' CHOICE

TransWarp Classic This 40MHz 68030-based board offers the best performance at a good price for Classic owners. **Company:** Applied Engineering. **List price:** \$798 (with FPU).

Gemini Integra This 50MHz accelerator also includes a video-display port, making it the best overall upgrade deal for SE owners.

Company: Total Systems. **List price:** \$1089 (with FPU).

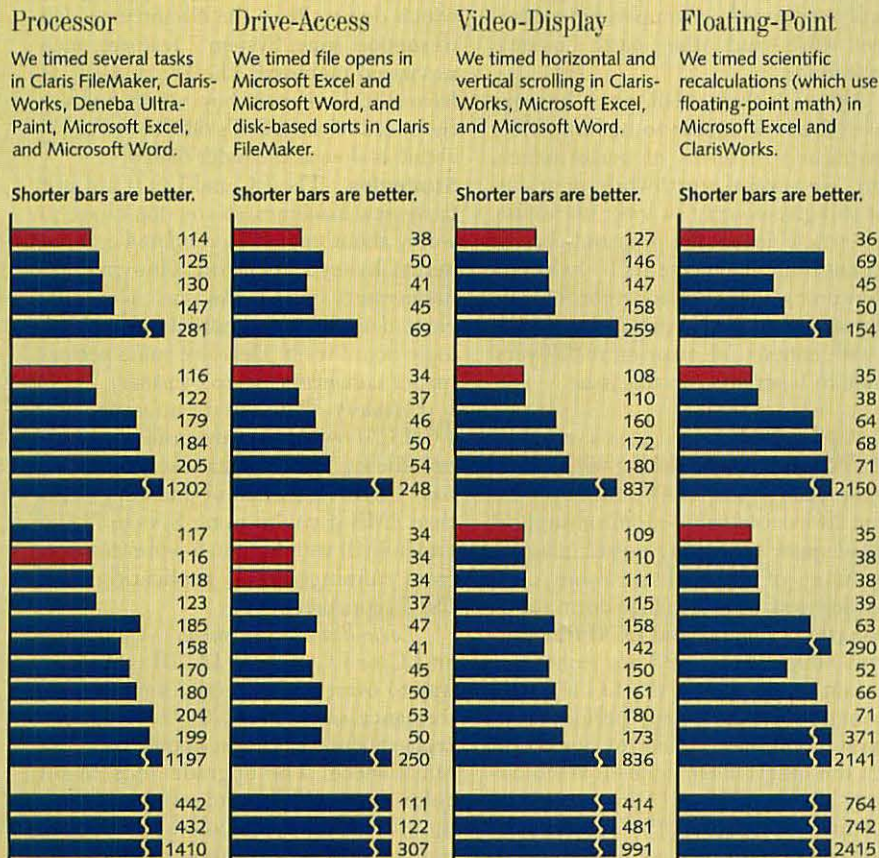
Quik30 The 25MHz version of this board offers inexpensive acceleration that will be sufficient for most SE owners. **Company:** Novy Systems. **List price:** \$449 (without FPU).

Universal PowerCache The 50MHz version with a math coprocessor is the best for SE/30 owners with demanding tasks, while the 33MHz is fine for most office users.

Company: DayStar Digital. **List price:** 50MHz, \$999 (with FPU); 33MHz, \$449 (without FPU).

COMPACT-MAC ACCELERATOR PERFORMANCE (in seconds)

Use these LC-specific speed results to compare acceleration options for your Mac LC. Results are presented for the four major types of tasks (processor-intensive, drive-access, video-display, and floating-point math); you should give the most weight to the results for tasks you do frequently. Unlike the rankings at left, these results cannot be compared with those of other Macs reported in this issue's other upgrades articles.



*Also sold by Total Systems as the Gemini Integra.

§Also sold by Novy's Systech division under the same name and by MacProducts USA as the RailGun Pro.

holding the back panel and slide out the logic board.

Weaknesses With games and CD ROM applications designed to run on a 640-by-480-pixel screen, you can't see everything that's happening because the Color Classic's screen is smaller (512 by 384 pixels). The logic board's 16-bit data bus limits overall performance.

Strategies The Color Classic accepts any PDS board designed for the LC, including accelerator, Ethernet, video-display, and Apple IIe emulation boards. Depending on your performance needs, add the appropriate board in see "Making the Most of an LC," in this issue. Add the optional 256K VRAM chip (\$99) from Apple to get 16-bit color. Add a video-display board to get 24-bit color.

Toasting the Compacts

WHEN YOUR TOASTER STOPS TOASTING toasty enough or fails to accept wider loads, you don't add a ToastCrisp module or a slot expander. You buy a new toaster. Compact Macs—despite their appliance-like design—do allow incremental changes. The performance of the Plus, SE, SE/30, Classic, Classic II, and Color Classic can all be enhanced. Deciding which upgrade path best suits your budget and suite of tasks is the trick. But if your needs are bigger than a breadbasket, you might need a new Mac. **m**

SUZANNE STEFANAC is a *Macworld* contributing editor who remembers the sound of disk-swapping with some small nostalgia.

Macworld Lab testing supervised by TIM WARNER.

Making the Most of an LC

How to choose the best—and most affordable—upgrades for your LC

by Galen Gruman

The best-selling Macs ever, the LC series—the LC, LC II/Performa 400, and LC III/Performa 450—offer good performance at hard-to-beat prices, making them the perfect Macintoshes for word processing, home-office computing, electronic-mail access, uncomplicated spreadsheet work, and other basic business applications.

Although their small, pizza-box size makes the LCs appear to be impossibly constrained in terms of performance, there are several worthwhile upgrades that will give your LC a long, useful life. This article covers the pros and cons of various LC enhancements to help you determine which ones are right for you. Products mentioned in this article are listed with contact information in "Buyers' Guide to Upgrades," in this issue.

LC and LC II (Performa 400, 405, 430)

THESE SLIM MACS WERE THE FIRST TO offer affordable color-monitor support and adequate processing power, plus the advantage of taking little room on a crowded desk or in a college dorm room.

Strengths The LC and LC II (the Performa 400, 405, and 430 are technically the same computer as the LC II) share a common design, so any peripheral or upgrade option designed for one works with the other. Their built-in video circuitry lets them drive 14-inch monitors at 8-bit color depth (256 colors)—the most common display configuration today. Their 32-bit-clean ROMs allow you to address memory above 8MB. (At press time, Apple discontinued the LC II.)

Weaknesses The LCs have just one Processor Direct Slot (PDS) and a 10MB RAM limit. Their weak, 25.6-watt power supply can barely power the logic board and one PDS board.

The LC uses a 68020 processor, which doesn't have the circuitry needed to support some System 7 features, such as virtual memory. The LC and LC II have a 16-bit system bus, which hobbles the speed of the LC II's 68030, making it about as slow as the older 68020.

Strategies The LC and LC II are still fairly new machines, so you don't have to worry about upgrading outdated components. Instead, focus on removing any unnecessary bottlenecks, such as insufficient memory or slow hard drives—or the logic board itself. Here are some performance enhancements to consider.

Memory The first upgrade any LC/LC II owner should consider is memory (the LC has 2MB standard; the LC II has 4MB). Insufficient memory—less than 8MB if you're using System 7, and under 4MB with System 6—prevents you from running several applications and INITs concurrently.

Logic-Board Replacements Upgrading an LC or LC II to an LC III is the best way to overcome generally sluggish performance, since Apple's \$599 logic-board replacement will almost double your system's speed. The upgrade adds 16-bit color depth (32,768 colors) for 14-inch monitors and 8-bit color for 16-inch monitors, as well as support for 15-inch monochrome portrait monitors.

There's one considerable drawback to this upgrade, though. The LC III's RAM

SIMMs differ from those used in an LC or LC II. As a result, any memory you've already added to your LC or LC II won't work with the LC III upgrade. If you recently bought this memory, you might be able to return it in exchange for LC III SIMMs, but it depends entirely on your dealer's refund and exchange policy (more on the LC III's SIMMs later).

Two boards—Extreme Systems' \$149 Extender (also sold under the Magic label by MacProducts USA) and DayStar's \$199 Equalizer LC—bypass the LC's 020 in favor of an 030. But they have only one (for most people, marginal) benefit: they make virtual memory available to System 7 users (see "Expanding a Compact Mac," in this issue, for more on virtual memory).

Acceleration While the LC III upgrade makes the best sense overall, anyone interested in the best possible raw performance will want an accelerator board. Macworld Lab tested seven accelerators for the LC and four for the LC II. DayStar Digital's 50MHz 68030-based PowerCache turned in the best performance—about 1.3 times as fast as the LC III. ("LCs: Replace or Accelerate?" shows the complete results.)

Surprisingly, an LC with Fusion Data Systems' TokaMac LC25 accelerator, which uses a 25MHz 68040, performed about 0.85 times the speed of an LC III, which has a 25MHz 68030. The LC III shuttles data 32 bits at a time, compared with the earlier LC's 16 bits at a time. As a result, in a given period of time the LC III moves more data than the LC, resulting in better performance.

Consider the other accelerator boards carefully. The 32MHz Impact 030 from Extreme Systems is a good buy and offers overall performance that is just a little slower than that of the DayStar board. But the others perform similarly to an LC III and can cost more than the LC III upgrade. The best strategy, then, is to go for the LC III upgrade or a 50MHz accelerator and ignore the rest.

Math Coprocessing Several vendors offer math coprocessors (also called a floating-point unit) mounted on boards that fit in the LC/LC II PDS. Macworld Lab tested boards from DayStar Digital, Logica Research, and Sonnet Technologies. (All the accelerators tested had a math coprocessor installed—an option that usually costs \$100 to \$150.)

Our tests confirmed the truth about math coprocessors: except for specialized math functions called transcendentals—which are used in waveform analysis, 3-D modeling, and other work involving curves—math coprocessors offer no performance boost. And if you're into that

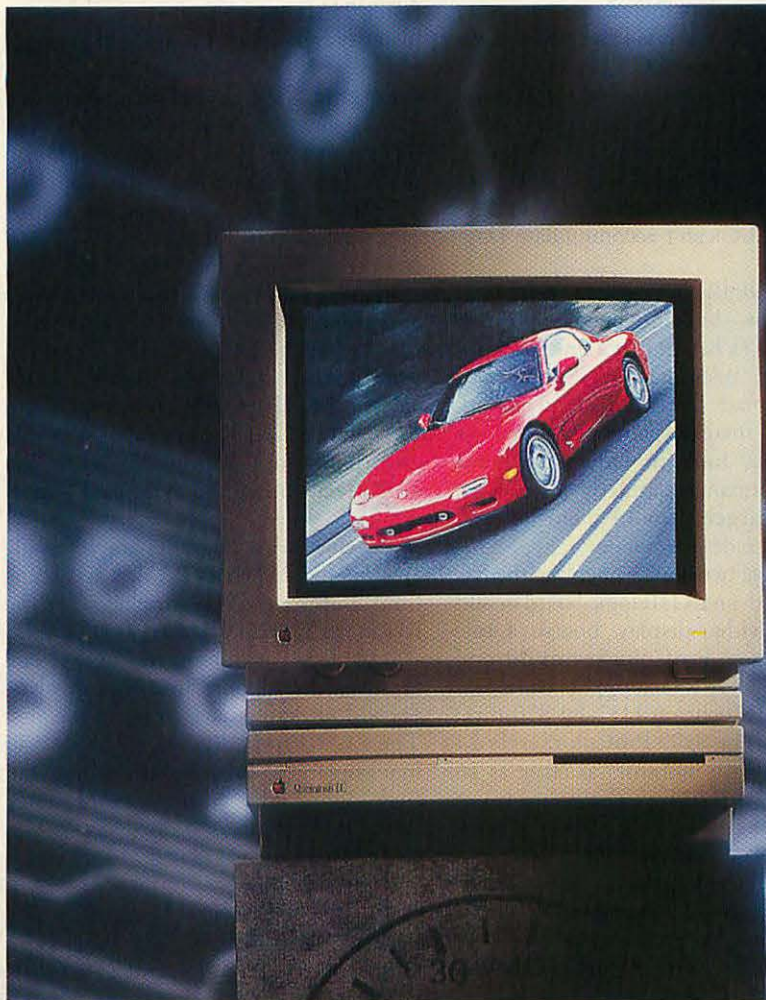
kind of detailed math, you're not likely to be doing it on an LC or LC II.

Slot Expansion When you need to expand your system—add a 24-bit video display, Ethernet, video capture, or an accelerator board, for example—don't assume you must get rid of your one-slotted LC model and buy a more expandable IIvx, Centris, or Quadra.

Two vendors offer slot-expansion devices that let you add PDS slots to an LC computer. Sonnet Technologies' Twin Slot LC is a \$349 kit that includes a bay for a second internal hard drive (the LC and LC II support only one), two PDS slots, a 40-watt power supply, and a taller LC cover so that all these add-ons will fit into the computer's slender pizza-box chassis.

The \$349 Max from DGR Technologies is similar, except it offers three PDS slots and a special case (which fits between the LC's case and cover) to provide the necessary expansion room.

Power Supply Another aspect of expansion is power. The LC models'



PHOTOGRAPH BY PAUL FRANZ; MOORE/SCREEN IMAGE BY GUY SPANENBERG

skimpy power supply may not be enough to handle some boards (which is why the slot-expansion kits include a new power supply). Apple has rated the power-handling ability for the LC PDS slots at 4w.

Several vendors, including Applied Engineering and Quadmaton, offer more-capable power supplies. DayStar, whose accelerator boards use about 8w, will provide a free power supply to anyone whose LC can't accommodate DayStar boards.

Video Display The LC and LC II have decent—but not speedy—built-in video RAM (VRAM) that's fine for word processing, presentation design, and spreadsheet use. But if you intend to work with color images, paint programs, or QuickTime, look to enhancing your video performance. Similarly, if you need monitors larger than 14 inches, you'll have to upgrade your video.

You have two choices: replace the LC or LC II with an LC III logic board or add a speedy video-display board. Lapis Technologies' ProColorServer 24 and ProColorServer 8•16 support monitors as large as 21 inches at 1152-by-870-pixel resolution. The \$599 ProColorServer 24 also works with monitors as large as 16 inches (832-by-624-pixel resolution) at 24-bit color depth (16.7 million colors), while the \$499 ProColorServer 8•16 supports displays as large as 16 inches at 16-bit color depth (32,768 colors).

Lapis has also announced the DisplayNet LC series (\$549), which lets you use 15-inch portrait and 19-inch two-page monitors in black-and-white and gives you Ethernet as well. The DisplayNet series is expected to be available by the time you read this.

Envisio offers a board that lets you work with multiple monitor sizes. The Quick 16 video-display board (\$495) provides 16-bit color on monitors as large as 16 inches and includes a socket for an optional math coprocessor.

An LC III upgrade provides the same capabilities as the ProColorServer 8•16 and the Quick 16, plus better overall performance, for about \$200 more (price includes buying the necessary VRAM for the LC). But the Lapis ProColorServer 24 and DisplayNet are clearly worthwhile for users who need that type of video. The LC III upgrade also supports 15-inch portrait monitors, such as the Lapis DisplayNet; this makes the upgrade, coupled with an Ethernet board, a better long-term alternative for users of portrait monitors.

LC III (Performa 450)

THE LC II WAS A MINIMAL UPGRADE TO the LC, at best. But with the LC III,

Apple has made some significant improvements (a faster 32-bit system bus, a faster 25MHz 68030 processor, greater memory capacity) to its lowest-cost, modular color Mac.

Strengths The LC III has fairly fast performance (nearly equal to a IIci); supports up to 36MB of system RAM; and offers video support for 15-inch portrait monochrome and 16-inch color monitors, with up to 16-bit color depth (32,768 colors) on 14-inch monitors. The 32-bit system bus also means that accelerators and other add-ons won't be hobbled as they are on the LC and LC II.

Weaknesses Like the earlier LC models, the LC III is restricted to just one PDS. The LC III's power supply remains underpowered, delivering just 4w to the PDS, even though many typical boards use 6w to 8w.

Strategies Few upgrades are yet available for the LC III (VRAM is an exception). But many of the strategies for the LC and LC II apply to the LC III as well.

Memory Although the LC III can theoretically support 36MB, most owners will probably have to settle for less. The LC III has only one RAM slot, so buy the largest-capacity SIMM you can find, since adding more memory later

means throwing away the additional RAM you installed earlier.

Unlike the LC and LC II, the LC III uses 72-pin DOS SIMMs, which are readily available in the 4MB capacity but not in larger sizes. If you look around you should be able to find 8MB and 16MB SIMMs—and doing so will ensure that you have memory to spare for the days when even 8MB isn't enough.

To get the LC III's 36MB maximum memory, you'd have to buy one 32MB SIMM board (the LC III comes standard with 4MB), but SIMMs in that capacity were just starting to ship at press time. Plus, the price per megabyte goes up as the SIMM capacity rises—one 16MB SIMM costs about 50 percent more than two 8MB SIMMs. So you'll pay more per megabyte than a colleague with a Centris or IIfx, which can achieve 36MB of RAM through multiple RAM slots.

Acceleration DayStar Digital has an adapter that lets its 50MHz 030-based PowerCache accelerator board work in the LC III.

Math Coprocessing The LC III is the first LC with a slot for an optional math coprocessor. Shop around (at local dealers and mail-order vendors) for a good deal on a Motorola 68882 math coprocessor.



LCs: Replace or Accelerate?

SYSTEM PERFORMANCE (times as fast as a Classic)

Products are ordered by type of Mac (bold names) from fastest to slowest. Within each type, products are ordered from fastest to slowest.

Use the rankings under the heading Common to compare your Mac system against all Mac systems (both standard and accelerated) throughout this issue's upgrades articles, to help decide between replacing or accelerating your Mac. Use the rankings under Scientific only if you do rendering or scientific work.

Common

We timed typical business tasks in Microsoft Excel and Word that use the Mac's processor, drives, and video display.

Scientific

We added to the common tasks several scientific calculations that use floating-point math.

= Fastest result in class for each test.

Longer bars are better.

Longer bars are better.

Mac LC III	
standard LC III (25MHz 030)	
Mac LC	
with DayStarPowerCache (50MHz 030)	
with Fusion TokaMac LC25 (25MHz 040)	
with DayStar PowerCache (40MHz 030)	
with DayStar PowerCache (33MHz 030)	
with Extreme Impact 030 (32MHz 030)	
with Extreme Extender (16MHz 030)	
with DayStar Equalizer LC (16MHz 030)	
standard LC (16MHz 020)	
Mac LC II	
with DayStar PowerCache (50MHz 030)	
with DayStar PowerCache (40MHz 030)	
with Extreme Impact 030 (32MHz 030)	
with DayStar PowerCache (33MHz 030)	
standard LC II (16MHz 030)	

3.6	3.9
4.5	9.5
4.2	7.0
4.1	8.6
3.8	7.9
3.8	7.7
1.9	3.3
1.8	3.2
1.8	1.9
4.4	9.5
4.1	8.7
4.0	7.9
3.9	8.0
1.7	1.8

Best Mac LC Upgrade Strategies

Devising the Best Strategy To get the most out of your Mac, increase not only its raw speed but also the capabilities of its main components: RAM, storage, video, and special-purpose processing.

BEST More RAM (a total of 8MB) is needed to take full advantage of System 7 features and to support today's memory-hungry software.

AVOID Apple's LC II logic-board upgrade is overpriced and delivers few benefits.

AVOID A math coprocessor aids only scientific analysis. If you do such work, you need a better Mac.

AVOID A 16MHz 68030-based accelerator gives the LC nothing but virtual-memory support.

AVOID Fusion Data Systems' 040-based TokaMac LC25 accelerator costs more and delivers less than other options.

BEST Apple's LC III logic-board upgrade is the best way to enhance an LC or LC II's overall performance.

GOOD DayStar Digital's 50MHz, 68030-based Universal PowerCache with its own RAM gives an LC the best raw performance.

LC ACCELERATOR PERFORMANCE (in seconds)

Use these LC-specific speed results to compare acceleration options for your Mac LC. Results are presented for the four major types of tasks (processor-intensive, drive-access, video-display, and floating-point math); you should give the most weight to the results for tasks you do frequently. Unlike the rankings at left, these results cannot be compared with those of other Macs reported in this issue's other upgrades articles.

Processor

We timed several tasks in Claris FileMaker, ClarisWorks, Deneba UltraPaint, Microsoft Excel, and Microsoft Word.

Drive-Access

We timed file opens in Microsoft Excel and Microsoft Word, and disk-based sorts in Claris FileMaker.

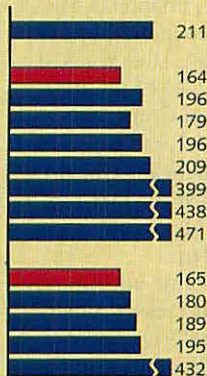
Video-Display

We timed horizontal and vertical scrolling in ClarisWorks, Microsoft Excel, and Microsoft Word.

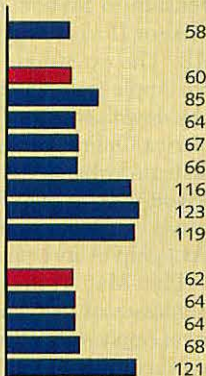
Floating-Point

We timed scientific recalculations (which use floating-point math) in Microsoft Excel and ClarisWorks.

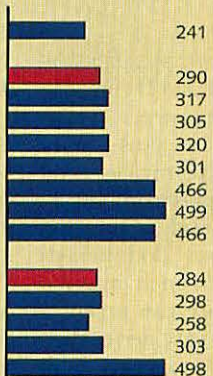
Shorter bars are better.



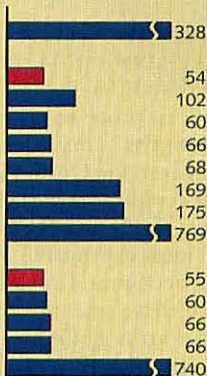
Shorter bars are better.



Shorter bars are better.



Shorter bars are better.



MW

EDITORS' CHOICE

Macintosh LC III Logic Board Upgrade

The Apple logic-board replacement for the LC and LC II makes the most sense economically, with a combination of improved performance, video display, and memory options that no accelerator board can offer.

Company: Apple Computer. List price: \$599.

processor; just make sure it runs at least as fast as the LC III's 030 processor (25MHz).

Slot Expansion Neither of the slot-expansion kits (Sonnet Technologies' Twin Slot LC and DGR Technologies' Max) for the LC and LC II was designed with the latest-model LC in mind. They should work in the LC III, but vendors had yet to test them at press time to verify this. If these kits do work with the LC III, they will be worthwhile purchases for anyone who needs multiple PDS boards. Expect the vendors to certify LC III compatibility later this year.

Video Display The LC III's built-in video satisfies most needs—especially with added VRAM. If you have a 16-inch monitor and want 16-bit or better color depth, consider either Lapis Technologies' ProColorServer or Envisio's Quick 16 video-display boards. If you have a 19-inch monochrome monitor, RasterOps offers both a gray-scale and a black-and-white video-display board. And Lapis plans to offer its DisplayNet video-display board for the LC III as well.

Building a Better LC

IF YOU'RE HAPPY WITH YOUR LC OR LC II as it is, leave it alone. But if you want better performance—for current or future work—you've got three good options.

- Replace your current LC or LC II with an LC III logic board. Overall, this is your best upgrade option.

- Get either the 50MHz DayStar Universal PowerCache or the 32MHz Extreme Systems Impact 030 accelerator board. This makes the most sense if raw performance is more important to you than expansion.

- Have your cake and eat it, too. Buy a fast accelerator, the Twin Slot LC or Mac slot expander, and a fast video-display board—and you'll still have room for at least one more board.

Unless you foresee a significant change in the type of work you do, and only a Quadra or other high-performance Mac will handle that work, upgrading your LC makes a lot of sense. **m**

Macworld Lab testing supervised by LAUREN BLACK.

Getting More from a Mac II

Top upgrade strategies for the Mac II and Centris midrange lines

by Jim Heid



AS SONGS GROW OLD, THEY BECOME classics. When computers grow old, they become frustrating. Fortunately, the Macintosh II family is more receptive to upgrades than most Macs are. All Mac II's, except the IIx, contain at least three NuBus expansion slots, which open the door to, among other things, accelerator boards that boost processing speed; video-display boards that provide more colors, faster display speed, or both; and network boards that provide faster alternatives to the built-in LocalTalk ports that all Macs have.

This article surveys both the Mac II line (except for the IIx, which is covered in "Building the Ultimate Mac," in this issue) and the Centris line, and assesses each machine's strengths and weaknesses, along the way spotlighting the upgrades that are most cost-effective for each model. Products mentioned in this article are listed with contact information in "Buyers' Guide to Upgrades," in this issue.

II and IIx

THE OLDEST AND LARGEST MEMBERS OF the Mac II family, the II and IIx are also the least prone to obsolescence.

Strengths Six expansion slots—more than even the Quadra 950 provides—and a heavy-duty power supply combine to make the II and IIx (as well as the IIx) the most expandable Macs. Both models can accommodate a 5¼-inch internal hard drive and therefore can accept a wider array of high-capacity drives than smaller Mac II's, whose cases were built to house only 3½-inch hard drives. (The

smaller-format hard drives don't yet have the capacity ranges of the 5¼-inch drives.) The Mac II and IIx can also handle two floppy disk drives.

Weaknesses The II and IIx do not have built-in video, which means you must fill one slot with a video-display board. If you have the computer's original hard drive, it's probably slow by today's standards—the 20MB, 40MB, and 80MB drives that Apple used in the Mac II had access times in the ballpark of 30 to 60 milliseconds; today, access times of under 20ms are common.

The Mac II and IIx ROMs aren't 32-bit clean and were designed to support only up to 8MB of system memory. You can work around these limitations, though—the Mode32 control panel from Connectix (bundled with many accelerators and available from most bulletin boards) bypasses the so-called dirty code in the computer's ROM. In addition, Apple's new 32-Bit System Enabler, an extension to System 7.1, enables a Mac II, IIx (or IIcx) to access memory beyond 8MB. The extension is available for \$10 from Apple (call 800/892-4649 to order) or by downloading it from CompuServe, America Online, or AppleLink. You can install more than 8MB on the logic board, but you need special RAM SIMMs containing a programmable-array logic (PAL) chip or its equivalent.

The Mac II has some additional weaknesses of its own. It lacks a SuperDrive; Apple sells a SuperDrive upgrade, the Macintosh FDHD Upgrade Kit, for \$385. The ROM chips in Mac II's that

were built before December 1987 contain a bug that prevents these machines from working with some accelerator boards, including the Radius Rocket. A free upgrade to the Revision B ROMs is available from any Apple dealer. (These ROMs are also included with the SuperDrive upgrade.)

Also, the Mac II lacks the Paged Memory Management Unit (PMMU) required for virtual memory. Motorola no longer manufactures its 68851 PMMU chip, although you might find one at a dealer that handles used Macs. Failing that, if you want virtual memory, you need to buy one of DayStar Digital's accelerators. They're the only Mac II-compatible accelerators that support virtual memory and don't require a PMMU on the logic board.

Strategies Apple offers a \$1799 logic-board upgrade that turns a II or IIx into a IIfx. But remember that you also need to buy memory—the IIfx can't use the existing SIMMs on your Mac II or IIx. And if you have a Mac II, you'll probably want the SuperDrive upgrade, too. When you're finished, you'll have a machine that's still quite a bit slower than today's faster Macs.

An accelerator board is a better upgrade for a Mac II or IIx. For ease of installation, the Radius Rocket boards are best: they install in a NuBus slot and don't require the delicate chip-pulling surgery that DayStar Digital's Universal PowerCache does. The Rockets' ability to accommodate up to 128MB of memory (using standard SIMMs) is another plus.



The Rocket 33 also turned in the best overall performance in Macworld Lab's tests. The Rocket 33 was, on average, more than twice as fast as DayStar's 33MHz Universal PowerCache and slightly faster than a Quadra 700.

There's a catch, though. The Radius Rocket boards are incompatible with such things as System 7 file sharing, System 7.1, AppleTalk Remote Access, and QuickTime. Version 1.5 of the RocketWare software (which comes with the Rocket accelerator boards) fixes most, but not all, of these incompatibilities (problems still exist with QuickTime and many sound-oriented products). RocketWare 1.5 is also available free through Radius technical support and online services.

If you're considering the DayStar PowerCache for a IIx, note that some newer IIx models have a soldered, rather than socketed, processor chip. If yours is soldered (you have to remove the hard drive mounting pan to check), send the logic board to DayStar Digital to have a socket installed (for free).

IIfx

WHILE NOT AS EXPANDABLE AS THE IICI, the IIfx, with the right upgrades and add-ons, is still a worthy midrange Mac.

Strengths The IIfx has three NuBus expansion slots and a rear-panel connector for an external SuperDrive. (One SuperDrive is built in—the case can accommodate a second SuperDrive if no hard drive is installed.) And the IIfx accommodates up to 128MB of RAM (using eight 16MB SIMMs).

Weaknesses The IIfx has no built-in video; once you install a video-display board you are left with only two slots free, cramping expansion possibilities. The 3½-inch hard drive bay limits internal hard drive capacity, though not significantly. The IIfx's ROM is not 32-bit clean.

Strategies Apple sells a logic-board upgrade that transforms the IIfx into a Quadra 700. The \$1999 upgrade includes 4MB of RAM (soldered to the 700's logic board), a microphone, a sound-input chip, and a new case. In addition, the

Quadra 700 provides you with fast, built-in 24-bit video, an Ethernet port, and a fast SCSI port. If those are the features your IIx needs (along with faster overall speed, of course), the Quadra 700 upgrade is a good choice and might actually cost less than several upgrade boards put together.

If you're just after faster processing, several accelerators—the Radius Rocket 33 and Impulse Technology's Performance/040 among them—make a IIx faster than a Quadra 700. Note that after adding an accelerator, some weak spots remain, including a relatively slow SCSI port and no Ethernet networking.

One strategy might be to combine a Radius Rocket equipped with the SCSI-2 Booster with one of E-Machines' Color-Link series video boards, which also provide Ethernet ports. Total cost: \$2200 to \$3200, depending on which Rocket you choose. This leaves one slot free for, say, a video-capture board.

IIci

A STILL-VIABLE MIDRANGE MAC, THE IIci accommodates a larger selection of performance enhancements than does any other Mac II.

Strengths The IIci has three NuBus slots and a cache card slot. The cache card speeds performance by providing a small amount (usually 32K to 64K) of fast memory, which holds the most recently used program instructions or data in the likely event the processor needs them again.

The built-in video is capable of displaying 256 colors, which is adequate for basic business tasks and spot-color publishing. The IIci accommodates up to 128MB of memory; the IIci's ROM is 32-bit clean.

Weaknesses The built-in video uses up to 300K of the IIci's memory, thereby slightly reducing the amount of RAM available for applications. More significant, this slows the machine when the SIMMs in Bank A are of a larger capacity

than those installed in Bank B. The 3½-inch hard drive bay limits internal hard drive selection.

Strategies The Quadra 700 logic-board replacement provides improved performance, 24-bit video, Ethernet, and faster NuBus and SCSI operations. If you're just after a speed kick, you have options galore. Simply installing a video-display board and not using built-in video will improve performance, though not as significantly as a cache card or an accelerator will.

Most IIci models contain Apple's 32K cache card (the card was an extra-cost option for early models). If yours is an older IIci and you want a modest performance gain, consider a cache card such as DayStar Digital's FastCache. FastCache boards containing 32K or 64K of cache memory are available for the IIci and retail for only \$189 and \$239, respectively.

For a bigger boost, consider an accelerator board. DayStar Digital's 68030-based Universal PowerCache boards install in the cache card slot (rather than taking up one of the three NuBus slots) and offer good performance and excellent compatibility.

DayStar's 68040-based Turbo 040 accelerators are faster still and also contain a Processor Direct Slot (PDS) that accepts a cache card. In Macworld Lab tests, the 33MHz DayStar Turbo 040 with the optional 128K cache card performed the best overall in typical midrange-Mac tasks. But if you're on a budget, it's hard to argue with Applied Engineering's TransWarp CI, a 50MHz 68030 accelerator that retails for just \$799 (\$958 with a math coprocessor [FPU]—we tested it with the coprocessor).

IIsi

WITH JUST ONE EXPANSION SLOT, THE IIsi is the least-expandable Mac II. It's also the only midrange Mac II for which Apple offers no logic-board upgrade.

Strengths The Mac IIsi is compact. Its expansion slot is flexible, accepting either one 68030 PDS board or one NuBus board (both require an adapter board for installation). The ROM is 32-bit clean, and the IIsi includes built-in 8-bit (256-color) video.

Weaknesses Large expansion boards can tax the small power supply. The IIsi has just four SIMM slots, limiting maximum memory capacity to 65MB. Built-in video, like that of the IIci, can slow overall performance. There's no built-in math chip (one is built into most 68030 PDS or NuBus adapter boards as well as many accelerators).

Strategies Fewer accelerators are available for the IIsi than for other Mac II's,

Best Mac IIci Upgrade Strategies

Devising the Best Strategy To get the most out of your Mac, increase not only its raw speed but also the capabilities of its main components: RAM, storage, video, and special-purpose processing.

GOOD Add a cache card to your IIci (available from several vendors) if it doesn't already have one. This is the cheapest performance booster.

GOOD A 50MHz 68030-based accelerator (from any vendor) offers a lot more raw performance at a decent price.

BEST More RAM (a total of 8MB) is needed to take full advantage of System 7 features and to support today's memory-hungry software.

BEST Apple's Quadra 700 logic-board upgrade is pricey but adds a better video-display system, much better performance, and faster SCSI communication.

Best Mac II Upgrade Strategies

Devising the Best Strategy To get the most out of your Mac, increase not only its raw speed but also the capabilities of its main components: RAM, storage, video, and special-purpose processing.

thanks largely to the IIsi's featherweight power supply.

Impulse Technology's Performance/040 board works in IIsi models equipped with Apple's NuBus adapter board, but think twice before installing one. When equipped with 8MB of memory, the Performance/040 draws 12 watts—just 3w short of the 15w limit for a NuBus board. Combine that with the 4MB of logic-board memory required by the Performance/040, and you're pushing the power supply to the max.

A PDS accelerator (which doesn't require its own memory) is a safer bet. For scientific tasks that use floating-point math, Logica's LogiCache Accelerator and DayStar's 40MHz and 50MHz Universal PowerCaches performed better than a Centris 610, with the Logica board performing better than a Quadra 700.

Another way to accelerate a IIsi is by replacing the oscillator clock that drives the processor. For about \$4 you can buy a replacement oscillator that boosts the IIsi's speed by around 25 percent. This process is not for the squeamish, however: tampering with the logic board voids Apple's warranty and, if done incorrectly, could fry your logic board. For more details on how to perform this operation, contact BMUG, a user group located in Berkeley, California, and request a reprint of its spring 1993 newsletter article called "Make Your Mac IIsi Zip." The cost is \$1. Send your reprint request with payment to BMUG, IIsi Upgrade Article, 1442A Walnut Street #62, Berkeley, CA 94709-1496.

The best way to expand a Mac IIsi is with a NuBus expansion chassis from Sec-

ond Wave. The Expanse NB8 and Expanse NB4 are desktop boxes that provide eight and four NuBus slots, respectively, as well as a power supply and fan. An adapter board plugs into Apple's NuBus adapter board, which in

turn goes into the IIsi's PDS. There's even room in the chassis case for an internal SCSI hard drive.

If you need fast 24-bit video and an Ethernet port, consider one of E-Machines' ColorLink SX-series NuBus

BEST A 1.44MB SuperDrive (available from several vendors) ensures that you can exchange data with any Macintosh user, and even DOS users.

BEST The Radius Rocket 33 accelerator (which uses a 33MHz 68030) is the most cost-effective speed booster.

BEST More RAM (a total of 8MB) is needed to take full advantage of System 7 features and to support today's memory-hungry software.

MAYBE Connectix's Mode32 software (available from bulletin boards) lets you address more than 8MB of system RAM. System 7.1 users can instead use Apple's 32-Bit System Enabler Extension.

Does It Make Sense to Upgrade a Duo Dock?

Apple's Duo Dock/PowerBook Duo promises the best of both worlds: a midrange desktop Mac and a lightweight portable. But can you upgrade the Duo Dock so that its life span justifies its cost? The answer is no—and yes. Here's why.

High Starting Cost The standard Duo Dock docking station is \$1079. A Duo 230 with 4MB of memory and an 80MB hard drive is another \$2609. What you get is a 33MHz, 68030-based Mac with two NuBus expansion slots and a hard drive bay (in the docking station) for a total of \$3688. A Cen-

tris 650 with 4MB of memory, an 80MB hard drive, a 33MHz 68040 processor, three NuBus slots, and a slot for another hard drive (or other storage device) costs \$3189—which shows that the Duo Dock's convenience certainly has its cost.

By the time you add such necessary items as a monitor, an extended keyboard, a mouse, and a modem to this Duo Dock system, you've spent almost \$5000.

Limited Expansion An accelerator board must be installed on a logic board to work, but the Duo's logic board offers no

expansion slots, due to its space constraints. As a result, you can't add an accelerator board.

It's Not Hopeless You can add to the docking station video-display boards, Ethernet boards, and other such hardware that extends the Mac's capabilities.

And while the docking station has just two NuBus slots (and hard-to-access ones, at that), Second Wave offers a solution to that problem: the Expanse series of NuBus expansion chassis. The Expanse NB4 (\$1295) has four NuBus slots; the Expanse NB8 (\$2295) offers eight NuBus slots.

Both models come with power supplies to power the extra slots.

The Price of Freedom With the types of upgrade available from Second Wave, you can get a desktop Mac roughly equivalent to a IIfx—for about twice the cost. The advantage is that you have a flexible system that can follow you anywhere. The disadvantage is that you're essentially stuck at a IIfx's level of performance, unless Apple later offers a faster PowerBook Duo (which is likely) and an upgrade path from the current generation of Duos (which is not).—GALEN GRUMAN

boards. If you want an accelerator and improved video or networking, your choices are simple: buy an expansion chassis or a more-expandable Mac.

IIvx (Performa 600)

PLENTY OF UPGRADE OPTIONS AND A generous array of built-in features give the IIvx a long life expectancy.

Strengths The IIvx has two NuBus expansion slots and an accelerator board slot (designed specifically for accelerator boards; it's not a PDS or a cache card slot). The IIvx has 32K of built-in cache memory and a math coprocessor (the Performa 600 has neither; otherwise, the two computers are the same).

There's room inside the case for a removable-media drive such as a CD ROM player or SyQuest drive. You can upgrade the IIvx to a Centris 650, and the IIvx can accommodate up to 68MB of RAM (four 16MB SIMMs). ROMs are 32-bit clean.

Weaknesses The Mac IIvx is no speed demon—it's slightly slower than a IIfx. Some accelerators are not yet compatible with the IIvx.

Strategies To display thousands of colors (on most monitors) instead of 256, add a VRAM SIMM to bring video memory up to 1MB. If you are interested in multimedia, CD ROM, or Photo CD, consider purchasing Apple's internal, double-speed CD ROM drive, the AppleCD 300i—it adds less than \$300 to the system cost.

The Impulse Performance/040 and Radius Rocket accelerators weren't compatible with the IIvx as of this writing and couldn't be tested. (The Rockets are IIvx-compatible when used under Radius's RocketShare multiprocessing software [\$499]; Radius says RadiusWare 1.5, the standard Rocket driver software, is IIvx-compatible.) The only IIvx-compatible accelerators tested were three from DayStar Digital's PowerCache series. The 50MHz PowerCache boosted overall performance by about 25 percent—nothing to get goosebumps over.

If you crave speed, go for Apple's Centris 650 logic-board upgrade (\$1199). In addition to a roughly 150 percent improvement in overall performance, you get a faster SCSI port and built-in Ethernet. The Centris 650 can't use any 1MB SIMMs you might have (its minimum SIMM size is 4MB), but this isn't a significant drawback, since the upgrade includes 8MB of RAM.

Centris 610 and 650

IF YOU HAVE ONE OF THESE LATEST Macintoshes, you probably aren't thinking about upgrades—yet. But both of

Apple's newest midrange Macs do provide room to grow.

Strengths The Centris 610 and 650 can accept a VRAM upgrade that allows them to display thousands of colors on most monitors. The 610 and 650 provide NuBus expandability, with the Centris 610

supporting one 7-inch NuBus slot (via a \$99 adapter) and the Centris 650 providing three full-size NuBus slots.

The 650 also has a PDS slot that accepts PDS boards designed for Quadras. Most models of the 610 and 650 come with built-in Ethernet ports. If you



Midrange Macs: Replace or Accelerate?

SYSTEM PERFORMANCE (times as fast as a Classic)

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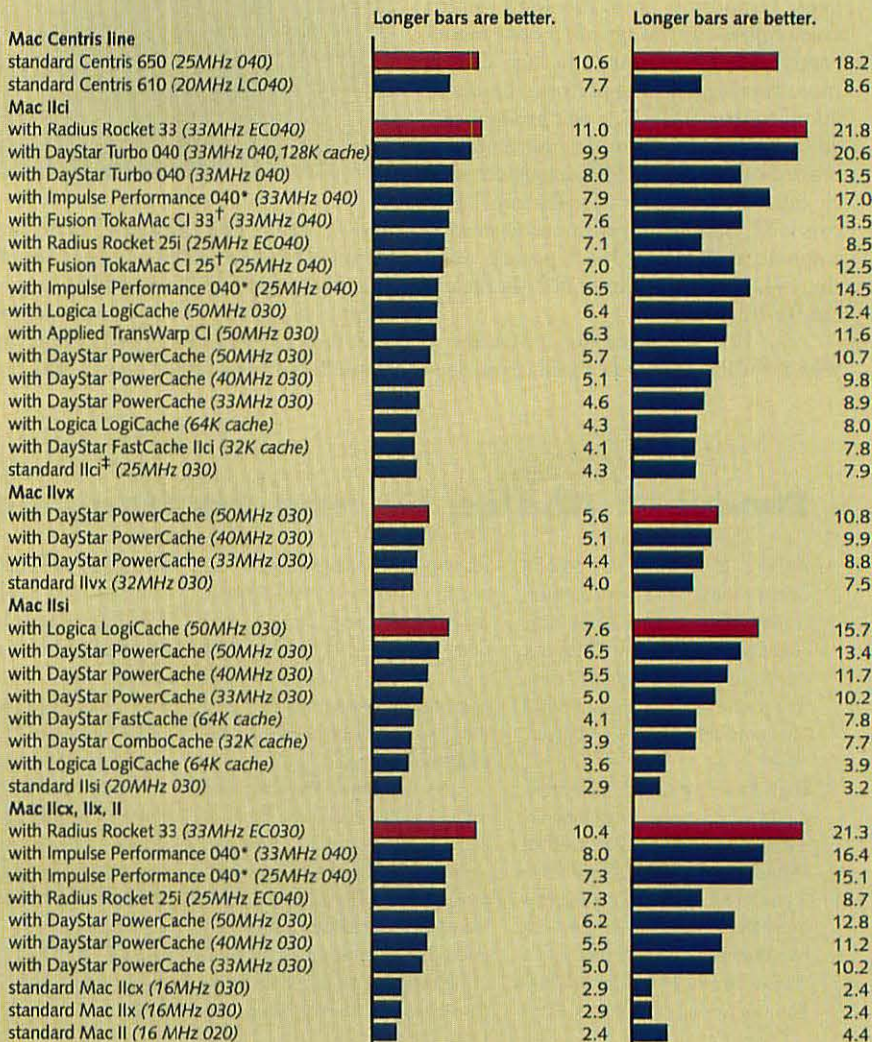
Common

We timed typical business tasks in Microsoft Excel and Word that use the Mac's processor, drives, and video display.

Floating-Point

We added to our common tasks several scientific calculations that use floating-point math.

= Fastest result in class for each test.



*Also sold by Applied Engineering as the TransWarp 040 series and by TechWorks as the 68040 NuBus Accelerator series.

⁺Also sold by Total Systems as the Magellan 040 series.

bought a model that doesn't include an Ethernet port, you can add one via third-party adapter board or SCSI-based box.

Weaknesses The Centris 610 has no math coprocessor, and the 610's expansion slot only accepts NuBus boards that are 7 inches long. Because the 610's slot

size is a new standard for Apple, few boards on the current market will fit it. In addition, you must buy a \$99 adapter to add a NuBus board to the 610.

Strategies If you buy a base-model Centris 650 or any Centris 610 and find yourself getting into 3-D graphics, you

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EDITORS' CHOICE

Radius Rocket 25i; Radius Rocket 33

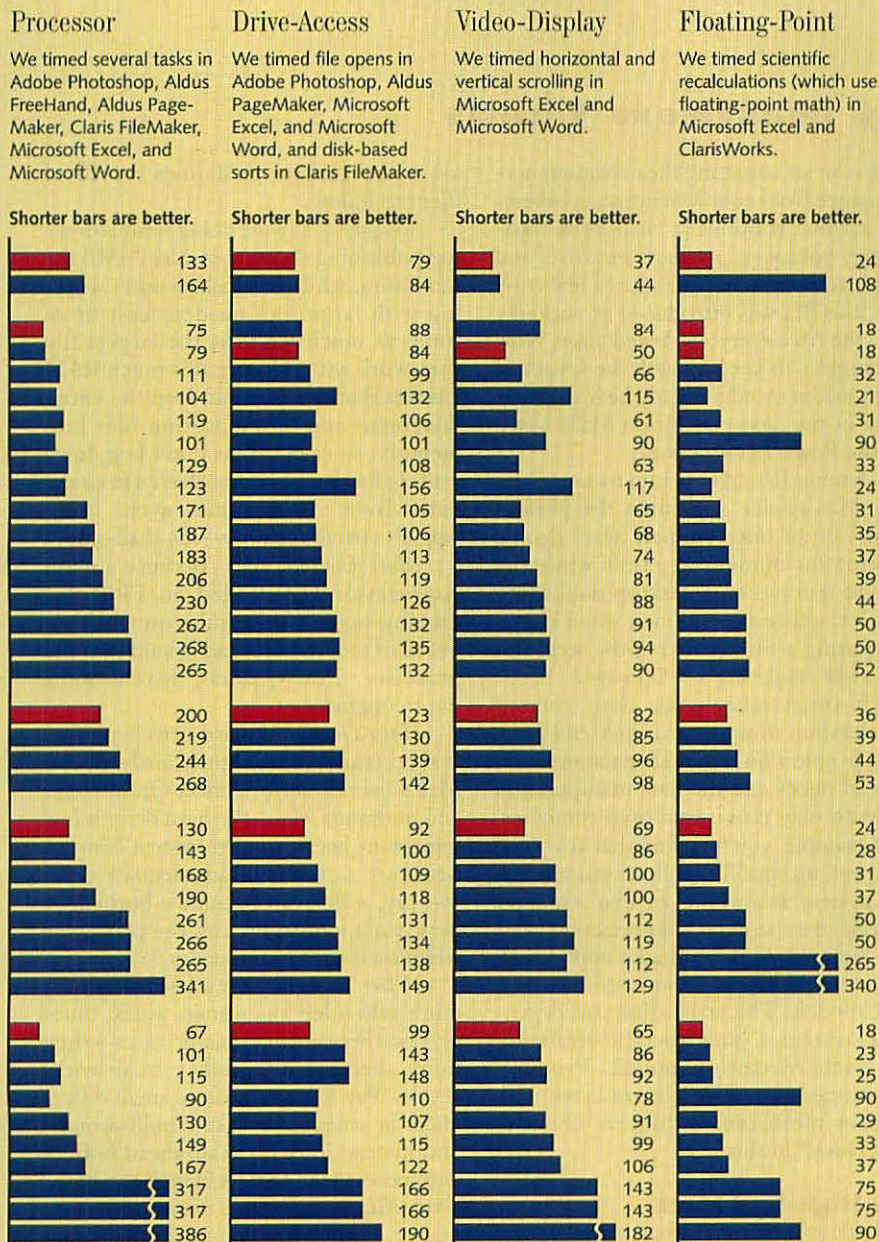
These NuBus-based accelerator boards provide top performance, expandability, and, with Radius's RocketShare software (\$499), sophisticated multi-processing capabilities. **Company:** Radius. **List price:** 25i \$1199; 33 \$2499.

DayStar Digital Universal PowerCache series

They aren't as glitzy as the Rockets, but the Universal PowerCache boards have the edge in compatibility. Throw in excellent documentation and reasonable prices, and you have the best values in accelerators. **Company:** DayStar Digital. **List price:** \$449 to \$999.

MIDRANGE - MAC ACCELERATOR PERFORMANCE (in seconds)

Use these LC-specific speed results to compare acceleration options for your Mac LC. Results are presented for the four major types of tasks (processor-intensive, drive-access, video-display, and floating-point math); you should give the most weight to the results for tasks you do frequently. Unlike the rankings at left, these results cannot be compared with those of other Macs reported in this issue's other upgrades articles.



might consider upgrading the processor from a 68LC040 (a version of the 68040 with no math coprocessor) to a full-fledged 68040, which has a built-in math coprocessor that speeds up 3-D rendering programs. (The base model of the 650, with 4MB of RAM and an 80MB hard drive, comes with the 68LC040 chip; other 650 models have the 68040.)

Radius says the Rocket family works in the Centris 650 when used with RocketShare. A Rocket-equipped Centris 650 running RocketShare essentially gives you parallel processing: two 68040-based Macs on your desktop, each capable of performing a task at the same time. You can, for instance, scan a large image using one processor and use the other processor for spreadsheet calculations, word processing, or other tasks.

Adding It All Up

WHETHER YOU BUY A NEW MAC OR upgrade an older one, keep in mind that faster, less expensive, more powerful machines will always be on the horizon.

The Macintosh world is a moving target, and your system is a snapshot—an image of the intersection between your budget and Apple's product line at the time of your purchase. If you can't afford to change that image by buying a new machine, it's comforting to know that you can at least spruce it up with accelerators and other upgrades. **m**

Contributing editor JIM HEID's primary machine—for now—is a Mac II with a 68040 accelerator. His latest books are *Inside the Apple Macintosh* (Brady, 1992) and *Macworld Guide to Word 5* (IDG Books Worldwide, 1992).

Macworld Lab testing supervised by MATTHEW CLARK.

†With a cache card; early IIfx models were sold without these cards and perform about 15 percent slower.

Building the Ultimate Mac

Want to max out your IIfx or Quadra? Here's how.

by Matthew Leeds

There is an art to getting the maximum performance from your Macintosh, a balancing act that continually changes as technology advances, products improve, and Apple rolls out new Macs. Just a few years ago, the IIfx was introduced as wickedly fast, the Mac everyone lusted after. Now it struggles to keep up with the Quadras, and Quadra owners already hear the siren song of the next-generation Macs based on the PowerPC processor.

Among IIfx and Quadra owners, who should consider upgrading the performance of the once-ultimate Mac? People waiting for minutes at a time while the screen redraws on a desktop publishing project, going out to lunch when color-separating a file, or taking the weekend off while rendering a 3-D image.

It often takes more than general acceleration to upgrade a high-end Mac. The people who use these machines have special needs and the data manipulation they do may require tailored remedies. For example, you may find that you need to speed up specific applications, not just the system as a whole, or that you have unusual data-storage requirements.

Some upgrade strategies apply to all high-end Macs; other strategies, to specific models. This article first covers general strategies, then specific strategies for each Macintosh model. Products mentioned in this article are listed with contact information in "Buyers' Guide to Upgrades," in this issue.

Some upgrade strategies apply to all high-end Macs; other strategies, to specific models. This article first covers general strategies, then specific strategies for each Macintosh model. Products mentioned in this article are listed with contact information in "Buyers' Guide to Upgrades," in this issue.

All High-End Macs

ALTHOUGH HIGH-END USERS TEND TO work on specialized applications, there

are some general guidelines for all of them to follow.

Memory Anyone doing serious desktop publishing should consider 20MB the minimum, while Photoshop users working with large files need at least three times as much RAM as the largest file they work with. Having this much RAM ensures that the Mac can load the entire document and its supporting files into memory, so calculations don't bog down waiting for data to be transferred from the hard drive. At all times avoid using Apple's virtual memory—it's snail-slow.

Math Coprocessing Because a math coprocessor (also called an FPU, for floating-point unit) resides on the logic board of the Mac IIfx and is built into the processor of the Quadras, there is nothing to upgrade.

Hard Drives A hard drive's performance contributes significantly to the Mac's overall performance. On low-end and midrange Macs, the hard drive is less important because other system components are slower. But an adequate drive for, say, a IIfx, can become a bottleneck between applications and the processor when used on, say, a Quadra 950.

When shopping for a fast hard drive, don't rely solely on average access times or raw theoretical transfer rates—they don't accurately predict real-world results. Pay less attention to small differences in access time (like 2 milliseconds) and instead look for read-ahead buffers and write-ahead buffers, which can make a significant difference in actual performance. Only a few companies manufacture the mechanisms used in high-speed,

high-capacity hard drives, so you can focus more on the vendor's price and the mechanism's performance than on the label on the case.

The latest hard drives offer gigabyte or better capacity, high data-transfer rates, and first-rate reliability. Macworld Lab tested several hard drives with capacities greater than 1GB and found that—with the exception of those using Seagate's ST11200N mechanism—all performed very well in terms of speed. The ST11200N mechanism was much slower—about 10 to 15 percent—in reading data than other mechanisms. (*Macworld* will cover high-speed storage in more depth in the August issue.)

We also found (based on tests of four systems) that, unless they use two SCSI ports simultaneously, drive arrays (also called Level 0 RAID, or redundant array of independent drives, systems) offer little or no performance advantage over regular high-capacity drives, despite a theoretical advantage. They also offer another disadvantage: increased chance of data loss. Data is written partly on one drive and partly on another, so if one drive has a problem, you might lose all the data stored on both drives.

SCSI Acceleration A related performance bottleneck is the SCSI port built into every Mac since the Plus. No Mac SCSI port can transfer data faster than about 3.5 megabytes per second (MBps). That's why many vendors support the new SCSI-2 standard, which adds new software and two new data bus types: SCSI-2 Fast and SCSI-2 Wide. SCSI-2 Fast offers a maximum transfer rate of

10 MBps; SCSI-2 Wide offers a maximum of 40 MBps.

SCSI-2 boards can provide better data-transfer rates than the native Mac SCSI port, particularly when coupled with drives that support SCSI-2 Fast and/or Wide. Note that some drives are labeled as SCSI-2 compatible or compliant; this just means that they support the SCSI-2 command set, and it is not a reliable means of determining if they support SCSI-2 Fast or Wide.

If you buy a SCSI-2 board that plugs into a NuBus slot, you're limited to a 10 MBps maximum transfer rate because that's the NuBus speed limit. The Quadras have a new version of NuBus, called NuBus 90, that can handle 20 MBps; but there are no SCSI-2 boards designed for NuBus 90, so even on a Quadra you are limited to 10 MBps. You can avoid this limit by using a SCSI-2 board that plugs into the Processor Direct Slot (PDS).

Port Expansion One form of expansion worth considering for all high-end

Macs is Applied Engineering's \$366 QuadraLink DMA, which adds four serial ports to any Mac. This high-speed serial board is useful with ultrafast modems or for controlling multiple serial devices such as several video tape decks. (A \$439 version includes the ShadowLAN software that lets users share the ports across a LocalTalk or Ethernet network.)

Video Display Publishers, product designers, and CAD users will want large screens—and probably photo-realistic 24-bit color—so accelerated, large-screen video is a must (see "24-Bit Color Graphics," *Macworld*, February). SuperMac Technology's \$2999 Thunder/24 is the fastest such board, and SuperMac's \$1849 Spectrum/24 PDQ Plus is a close second at a much lower price. Both beat even the speed of the Quadra 950's internal 24-bit video. Other users should consider adding VRAM.

IIx

ALTHOUGH DISCONTINUED A YEAR AGO, the IIx lives on today through Apple's



PHOTOGRAPH BY PAUL FRANZ-MOORE/SCREEN IMAGE BY RON PERRY

logic-board replacement that turns a Mac II or IIfx into a IIfx. Its performance is comparable to that of the new midrange Centris Macs and, for some tasks, to the Quadra 700.

Strengths With six NuBus slots, the IIfx is one of the most expandable Macs ever made, and its 128MB maximum memory will meet most high-end users' needs. Its 40MHz 68030 processor and accompanying 68882 math coprocessor are fast enough for many computation-intensive tasks.

Weaknesses The IIfx does not use a 68040, which is clearly the de facto high-

end Mac processor. (Among the 68040's advantages is a built-in math coprocessor that works faster than the 68030/68882 combination in the IIfx—an important consideration for rendering and CAD users.) Since it's a discontinued product, long-term support and compatibility remain in doubt. For example, the IIfx uses a special type of RAM (a 64-pin SIMM also used in the Apple LaserWriter IINTX) that no other Mac (or other popular computer) uses, and this RAM is likely to be harder to get as fewer IIfx's remain in use and the incentive for companies to provide it decreases.

Strategies If you have already invested a lot in your IIfx, such as adding a lot of RAM and accelerated video, it's probably worthwhile to stick with the system you already have. But keep in mind that a fully loaded Centris 650 (about \$5100) or Quadra 800 (about \$8100) offers a platform that will let you improve your processing power over the long term. By selling your IIfx and buying a new Mac (and keeping the IIfx's NuBus boards for that new Mac), you may spend only a little more than you would to upgrade, but you would be getting a better, long-term configuration.

Acceleration Adding a 33MHz 68040 accelerator to a IIfx can boost its performance to that of a Quadra 950, but not all 68040-based accelerators offer the same speedup. Macworld Lab testing revealed that Impulse Technology's \$2399 33MHz Performance/040 provides only nominal improvement (about 1.4 times as fast as the stock IIfx), compared with 1.8 times as fast for Fusion Data Systems' \$2395 TokaMac IIfx33.

At press time, Radius's Rocket 33 did not support the IIfx because of software incompatibilities, but Radius expects a IIfx-compatible version to be available by the time you read this. The Rocket 33's list price, including the necessary software, is \$2499, plus you must also buy separate RAM for the Rocket, since it does not use the IIfx's RAM. As you can see, the cost of a Rocket can really add up fast. The Rocket does let you add piggyback boards to accelerate SCSI performance and Photoshop filters.

Several vendors have promised to release a new crop of 40MHz 040 accelerators by the time you read this; if ultimate speed is your goal, you should go for one of these.

A much less expensive acceleration method is Newer Technology's VSO-IIfx, which directly speeds up—it does not bypass or replace—the Mac IIfx's own processor. This \$435 option boosts speed by about 30 percent. This option requires the user to experiment with overdrive settings, because a setting that is too fast can result in system crashes. To use the maximum setting might require replacing the RAM in your IIfx with faster RAM.

Fast Storage The fastest storage system in our tests by far was Newer's SCSI II Dart, which combines a IIfx PDS SCSI board and a RAM drive (a box containing special RAM chips that works like a hard drive but much faster). In real-world tests, it ran twice as fast as the fastest hard-drive system on the IIfx. But it's very expensive: the 128MB version we tested costs \$9816; at its maximum storage of 512MB,

Best Quadra 900 Upgrade Strategies

Devising the Best Strategy To get the most out of your Mac, increase not only its raw speed but also the capabilities of its main components: RAM, storage, video, and special-purpose processing.

MAYBE MicroNet's Raven/040e external 1GB drive array offers top hard-drive performance needed by image servers and for other data-intensive uses.

BEST More RAM is needed to take full advantage of System 7 features and to support high-end publishing and graphics software.

MAYBE Increasing video RAM lets you display as many as 16.7 million colors on a 16-inch monitor. If you need such color depth on a larger monitor, get a video-display board instead.

BEST A cache card (available from several vendors) is the cheapest performance booster.

MAYBE Applied Engineering's Quadra-Link DMA lets you attach four serial devices to one serial port, which is great if you use the Quadra as a server or as a manufacturing-control system.

AVOID Apple's Quadra 950 logic-board upgrade offers little but a faster processor, whose performance you can get much more cheaply with a cache card.

it costs \$34,072. You also need a SCSI-2 board to get the best performance from the SCSI II Dart.

For hard drives, the best bet is PLI's \$502 QuickSCSI board and any vendor's SCSI-2 Fast drive. Not only is PLI's board the fastest among those we tested, but it is also the most affordable. We also saw some benefit to using a drive array with the QuickSCSI board, but you might be better off spending your money on a faster single-drive system than on an expensive array.

Case Expansion One pricey option is to have your IIfx logic board installed in a tower case. Sixty Eight Thousand offers a Dash 30fx upgrade to a IIfx that includes a tower case that holds up to ten half-height drives, a 400-watt power supply, and a SCSI-2 board. The Dash 30fx also accelerates the 40MHz IIfx's logic board to 50MHz. You'll need special fast RAM to run at 50MHz, and this upgrade costs \$3000, far too expensive for what you get.

Quadra 700

WHEN FIRST RELEASED 18 MONTHS AGO, the Quadra 700 offered users high performance but minimal expansion for a fairly high price. Today, the Centris 650 offers a better package in terms of both price and design, but Quadra 700 owners can still do some things to enhance the Mac's capabilities.

Strengths The Quadra 700 has a fairly fast processor (25MHz 68040) and supports up to 2MB of VRAM, providing users with 24-bit display on monitors as large as 16 inches without a video-display board.

Weaknesses The Quadra 700 has limited expansion, with no accessible drive bays and room inside for just one floppy drive and a single third-height 3½-inch hard drive. The 700 has just two NuBus slots, and if you use the PDS slot (cache cards plug into the PDS slot as do some SCSI-2 boards), the PDS board will cover one of those slots, making it unavailable.

Strategies The Quadra 700 is a dead-end Mac, with little room for expansion. The fact that Apple decided not to create an upgrade kit to convert it to a new Quadra 800 shows this limited appeal clearly. If you seek a powerful Mac for the long term, sell your Quadra 700 and replace it with a Centris 650 (which is just as powerful but much more expandable) or consider a Quadra 800 (which seems designed for a long future). If you decide these options cost too much, consider the following upgrades to make the most of your Quadra 700.

Acceleration and Caching You will not find an accelerator board per se for

Putting Together the Ultimate Mac

How do you build the ultimate Mac for color publishers, multimedia developers, or product developers? Here's what we recommend (prices are list prices).

1. **Basic System** Start with a Quadra 950 (\$5609). Add 16 of Newer Technology's 16MB SIMMs to bring the total memory up to 256MB (\$10,800).

2. **Video Display** Add 1MB of VRAM (\$318) to bring the total VRAM to 2MB, which lets the Quadra's built-in video generate 24-bit display. Attach a 14-inch Apple monitor (\$589) or an NEC 3FGx monitor (\$749) to the internal video. Add a SuperMac Thunder/24 and Super-Match Two-Page Color display (\$5998 together). This setup lets you view image and layout files at full size while keeping tool palettes and other elements on the smaller monitor.

3. **Application Acceleration** Add a SuperMac ThunderStorm board (\$999) to speed up Photoshop and other image-editing applications.

4. **Storage** Install a DayStar FastCache Quadra cache card (\$449) and a MicroNet Raven/040e drive array (\$4590). Install a MicroNet Q9i-D8000 tape drive (\$2495) for back-up. Add Pioneer's DRM 604-X CD ROM drive (\$1795), ShirtPocket Software's SpeedyCD for caching (\$70), and Pinnacle Micro's Recordable CD RCD-202 write-once CD ROM drive (\$3995).

Total cost: \$37,707 (system pictured below).



PHOTOGRAPH BY PAUL TRANZ/MOORE/SCREEN IMAGE BY GUY SPANGLBERG

a Quadra. Instead, you have two options: an overdrive processor or a cache card. An overdrive processor runs the Mac's processor faster than its rated speed by accelerating the clock that controls the processor. A static-RAM cache card provides the processor a high-speed scratch pad to store commonly used data and instructions.

Macworld Lab tests show that the cache-card option is the better bet. For example, DayStar's \$299 FastCache Quadra 128K cache card caused the Quadra 700 to perform about 1.17 times as fast, making it almost as fast as a Quadra 950. (DayStar also sells a \$449 FastCache that works on all Quadras; the \$299 version works just on the Quadra 700 and 900.)

By comparison, the \$435 VSO-700 accelerator from Newer Technology boosts the Quadra 700 to about 1.14 times the speed. An overdrive processor also requires the user to experiment for the best speed through a control panel (if

set too fast, the processor can cause the Mac to crash). If you want to install both the FastCache Quadra and the VSO-700 (which offer only a little extra performance when used together), you'll need to use the \$449 version of the FastCache Quadra.

Fast Storage Your best bet on the Quadra 700 is the PLI QuickSCSI board (\$502), in conjunction with a fast, SCSI-2 hard drive.

Slot Expansion While you can get around the Quadra 700's limited drive-bay capacity by adding external SCSI devices, you'll need a third-party product to get around the limit of two NuBus slots. Second Wave's two Expanse chassis do just that. One offers four additional slots (\$1295); another offers eight (\$2295). If you're considering the four-slot version, consider instead replacing the Quadra 700 with a Quadra 800, which offers three slots, runs faster than a Quadra 950, and will probably be supported longer than the 700.

Quadra 900 and 950

THE BIGGEST MACS IN TERMS OF SIZE have few upgrade options, which is not surprising if you consider the processing power and expansion capabilities that are built into them. Most options make the Quadra 900 into a Quadra 950.

Strengths Both Quodras offer sufficient expansion for high-end users who need lots of storage and NuBus boards.

Weaknesses The design of the internal bays limits a user's possible configurations by having only two drive bays accessible for removable media; the other two bays can be used only for hard drives.

Strategies If you have a Quadra 900, use a cache card to bump its speed up to that of a Quadra 950. A Quadra 950 owner need worry only about optimizing the Quadra's performance.

Logic-Board Replacement Apple's \$1899 upgrade that makes a Quadra 900 into a Quadra 950 is overpriced. Bypass it in favor of system acceleration.

Acceleration and Caching Just as with a Quadra 700, the two acceleration options are an overdrive processor and a static-RAM cache card. And here, too, the cache card makes the most sense. For the Quadra 900, DayStar's \$299 FastCache Quadra is cheaper than Newer Technology's \$435 VSO-900, and the FastCache delivers better speedup (1.18 times as fast with the cache card versus 1.14 times as fast with the overdrive processor). For the 950, the only option is a cache card. DayStar's \$449 FastCache Quadra boosts the 950's speed by 1.2 times according to Macworld Lab tests. (The Quadra 950's fast system bus requires the more expensive version of the FastCache Quadra than does the Quadra 900's slower bus.)

Network Server For people seeking a fast network server, Apple has announced the Apple Workgroup Servers, which are based on the Centris 610, Quadra 800, and Quadra 950. You can upgrade a Quadra 900 or 950 to the Apple Workgroup Server 95 by adding a PDS board (\$2499) that turns the Quadra into an accelerated 950 and includes two direct memory access (DMA) SCSI channels, which let you connect as many as 20 SCSI devices to the server. Among the five other upgrade options announced is a \$4399 kit that includes a PDS board and a 4mm tape drive, which adds from about 4GB to 6GB of storage. Sold separately is AppleShare Pro, a fast network operating system based on A/UX 3.01 (a new version of Apple's Unix operating system), included in the Apple Workgroup Server 95. Apple's upgrades are set for release this spring (see "Apple Finally Steps into Server Market, Introduces Speedier AppleShare," *Macworld News*, May 1993).

Fast Storage In tests of storage systems based on drive arrays, the MicroNet Raven/040e screamed through both the real-world and raw tests. It uses both built-in SCSI ports in the Quadra 900 or 950, and the results show the advantage (and cost savings) of that approach. The PLI MiniArray 040 uses a similar technique, and also had standout results. Of the storage systems tested that used a SCSI-2 board, the Storage Dimensions Data Cannon PDS board with a MacIn-Stor Array had the best real-world performance; when used with PLI's Quick-SCSI board the MiniArray performed equally well. Overall, the \$4590 Raven/040e drive array had the best price-to-performance ratio.

Slot Expansion With five NuBus slots, expansion is unlikely to be an issue for even the most high-end users. But if it is, Second Wave offers the \$1295 four-slot NuBus expansion chassis and the \$2295 eight-slot version.

Case Expansion For Quadra 950 users seeking a tower design with the kind of storage capacity found in traditional Unix and DOS tower workstations, Sixty Eight Thousand offers the \$2500 Dash

40Q, which replaces the Quadra 900 or 950's case with one that supports up to ten half-height drives (six of which are accessible for use with removable media), and up to 512MB of RAM (using proprietary 32MB SIMMs that cost \$1990 each). Both a SCSI-2 Fast controller and a SCSI-2 Fast and Wide controller are available as options. A 400w power supply replaces the Quadra 950's 300w supply. Sixty Eight Thousand also sells the Dash 40Q with a Quadra 950 logic board already installed; prices start at \$8800. The company has announced an accelerator option for the 40Q (expected this spring).

Quadra 800

THE NEWEST QUADRA IS THE BEST designed, but its newness means there are almost no upgrade options for it. Still, it appears to be designed for the long term.

Strengths The Quadra 800 runs faster than a Quadra 950; supports up to 136MB of RAM; and includes three NuBus slots, three drive bays that can hold removable media, and another bay that holds up to two hard drives.

Weaknesses The only significant



High-End Macs: Replace or Accelerate?

SYSTEM PERFORMANCE (times as fast as a Classic)

Products are ordered by type of Mac (bold names) from fastest to slowest. Within each type, products are ordered from fastest to slowest.

Use the rankings under the heading Common to compare your Mac system against all Mac systems (both standard and accelerated) throughout this issue's upgrades articles, to help decide between replacing or accelerating your Mac. Use the rankings under Scientific only if you do rendering or scientific work.

Common

We timed typical business tasks in Microsoft Excel and Word that use the Mac's processor, drives, and video display.

Scientific

We added to the common tasks several scientific calculations that use floating-point math.

= Fastest result in class for each test.

Mac Quadra 800	
standard Quadra 800 (33MHz 040)	
Mac Quadra 950	
with DayStar FastCache Quadra (128K cache)	
standard Quadra 950 (33MHz 040)	
Mac Quadra 700, 900	
with DayStar FastCache Quadra (128K cache)	
with Newer VSO-700* (33MHz overdrive)	
standard Quadra 700, 900 (25MHz 040)	
Mac IIfx	
with Fusion TokaMacIIfx33 (33MHz 040)	
with Impulse Performance/040† (33MHz 040)	
with Newer VSO-IIfx* (55MHz overdrive)	
with Impulse Performance/040† (25MHz 040)	
standard IIfx (40MHz 030)	

Longer bars are better.

	13.4	22.9
	14.6	26.1
	12.0	20.7
	11.5	20.7
	11.2	20.2
	9.8	16.7
	12.2	22.9
	9.4	18.3
	8.8	18.6
	8.1	15.9
	6.6	13.7

* The Quadra 700 was tested with 70ns RAM, and the IIfx with 60ns RAM; the actual overdrive speed will vary based on RAM speed.

Ultimate Storage for the Ultimate Mac

With the mail-order price of a 2GB hard drive hovering around \$2300, large amounts of storage—tens of gigabytes—remain very expensive. But there are other options.

Optical-Drive Jukebox This device uses optical drives and a robotic disc changer to shuttle read-write optical discs in and out of the drives. Data-transfer rates are similar to those of standard hard drives, and disc changes occur in less than 10 seconds. Most of the larger-capacity systems we looked at use their own software, but are based on a drive mechanism manufactured by Hewlett-Packard. Systems with 10GB to 90GB of storage are available with prices starting at around \$10,000.

CD ROM Jukebox If you need to keep multiple CDs accessible, the \$1795 Pioneer DRM 604-X jukebox uses a single drive with a six-disc changer, and offers a rotational speed four times that of standard drives.

Write-Once CD ROM If you have data that remains the same but you still need to access it on a regular basis, consider purchasing a write-once CD ROM system. Several vendors produce easy-to-use systems, with prices starting around \$4000. These vendors include JVC, Kodak, Meridian Data, Optical Media International, and Pinnacle Micro. Add either a CD jukebox system or a fast CD ROM drive.

Double-Speed CD ROM Drive The latest generation of CD ROM drives offer greatly improved performance. Toshiba's XM-3401B drive spins a CD twice as fast as a standard drive. This, coupled with a lighter, faster split-optics head, produced phenomenal test results on pre-production units. Compared with the older XM-3301 series drive, the sustained read numbers went from 144K per second to 315K per second, and the average access time went from 356ms to 219ms. Expect several vendors to offer double-speed CD ROM drives based on mechanisms from Toshiba and other manufacturers this spring, with prices of about \$700.

Caching Software To gain even better results in retrieving data from a CD ROM drive, use a CD ROM caching program like ShirtPocket Software's \$70 SpeedyCD or FWB's \$79 CD ROM Toolkit. These programs cache the directory structure of the CD on your hard drive, greatly decreasing the access times for data.

MW

EDITORS' CHOICE

QuickSCSI Although this SCSI board does not support SCSI-2, it still turned in the best results overall at the lowest cost for 11x SCSI acceleration. **Company:** PLI. **List price:** \$502.

FastCache Quadra This 128K static-RAM cache card boosts a Quadra's performance to about 1.2 times for a low cost. **Company:** DayStar Digital. **List price:** \$299 for Quadra 700 and 900, \$449 for Quadra 800 and Quadra 950.

weaknesses of the Quadra 800 are that it requires a video-display board to support 24-bit color and that it supports only one 5¼-inch drive in its bays, which won't affect most users. (You can always use external drives of that size once you've filled that internal bay.)

Strategies This is the Quadra to upgrade to by selling your old Quadra. Until the next generation of Macs arrives and provides companies opportunities—and technologies—to upgrade the Quadra 800, your upgrade strategy will be mainly to optimize performance.

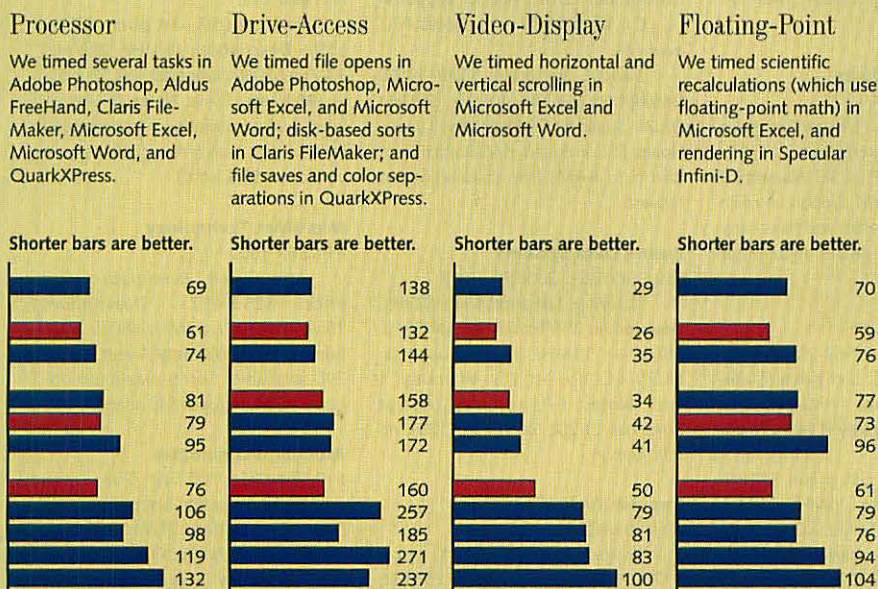
Caching A static-RAM cache card, such as DayStar's \$449 FastCache Quadra, should make the 800 run at about 1.2 times its regular speed.

Fast Storage The Quadra 800 is similar to the 700 in that it has a single SCSI port, so you can't use a dual-port drive array as in the 900 series. Your best bet is to start with a fast hard drive and add a SCSI board if you need more speed. The \$502 PLI QuickSCSI board is your most cost-effective choice.

Slot Expansion If you need more than five NuBus slots, consider Second Wave's Expanse chassis. The \$1295 Expanse NB4 adds 4 slots, while the \$2295 NB8 adds 8 (16 is the maximum number of slots supported by NuBus). However, most people will find the Quadra 800 to be fine just the way it is.

HIGH-END-MAC ACCELERATOR PERFORMANCE (in seconds)

Use these LC-specific speed results to compare acceleration options for your Mac LC. Results are presented for the four major types of tasks (processor-intensive, drive-access, video-display, and floating-point math); you should give the most weight to the results for tasks you do frequently. Unlike the rankings at left, these results cannot be compared with those of other Macs reported in this issue's other upgrades articles.



†Also sold by Applied Engineering as the TransWarp 040 and by TechWorks as the 68040 NuBus Accelerator.

Building a Better High-End Mac

ULTIMATELY, UPGRADING YOUR high-end Mac means tailoring it to your needs. Speed is just one factor in creating an optimal system. By balancing all the system components, you will get a turbo-charged Mac for the long term. Think of it as holistic computing for the power-hungry. **m**

MATTHEW LEEDS is the technical-services manager for a major software developer.

Macworld Lab testing supervised by MARK HURLOW.

Buyers' Guide to Upgrades

by Suzanne Courteau

Accelerators

Unless otherwise noted, all the accelerator boards listed below support virtual memory (VM) through either System 7 or Connectix's Compact Virtual 3.0 and come with a 30-day money-back guarantee. Math coprocessors are indicated as FPU.

Applied Engineering

214/241-6060, 800/554-6227

TransWarp. List price: \$349-\$958. Description: 16MHz, 25MHz, 33MHz, 40MHz, 50MHz 68030. Supports: SE, Classic, Ili. Warranty: 1 year. Notes: FPU available; 16MB maximum on-board RAM (TransWarp CI uses system RAM).

Brainstorm Products

415/964-2131

Brainstorm Accelerator. List price: \$249-\$289. Description: 16MHz 68000. Supports: Plus, SE. Warranty: 1 year. Notes: No VM support; accelerates both the processor and the system bus to 16MHz; dealer installation recommended.

DayStar Digital

404/967-2077, 800/962-2077

Equalizer LC. List price: \$199-\$279. Description: 16MHz 68030. Supports: LC. Warranty: 3 years. Notes: FPU available.

Turbo 040. List price: \$1299-\$1599. Description: 25MHz, 33MHz 68040. Supports: SE/30, LC III, II, Ili, Ili, Ili, Ili. Warranty: 3 years. Notes: FPU included; Ili may require installation by DayStar; SE/30, II, Ili, Ili, Ili require \$49 adapter.

Dove Computer Corporation

919/763-7918, 800/849-3297

Marathon Racer 030. List price: \$499-\$599. Description: 16MHz, 33MHz 68030. Supports: Plus, SE, Classic, II. Warranty: 1 year. Notes: FPU available; dealer installation recommended; no 30-day moneyback guarantee.

Extreme Systems

206/575-2334, 800/995-2334

Extender. List price: \$149-\$219. Description: 16MHz 68030. Supports: LC. Warranty: 3 years. Notes: FPU available.

Impact 030. List price: \$479. Description: 32MHz 68030. Supports: LC, LC II. Warranty: 3 years. Notes: FPU available.

Vandal. List price: \$699-\$999. Description: 33MHz, 40MHz, 50MHz 68030. Supports: SE, Warranty: 3 years. Notes: FPU included; 16MB maximum on-board RAM; free installation on request.

Fusion Data Systems

512/338-5326, 800/285-3813

TokaMac. List price: \$845-\$2395. Description: 25MHz 68040, 68LC040, 68EC040; 33MHz 68040. Supports: SE/30, LC, Ili, Ili, Ili. Warranty: 1 year. Notes: FPU included (except TokaMac CI 25i, SX 25i, ELC 25i); no VM support.

Impulse Technology

404/889-8294

Performance/040. List price: \$1750-\$2399. Description: 25MHz, 33MHz 68040. Supports: II, Ili, Ili, Ili, Ili. Warranty: 2 years. Notes:

FPU included; no VM support; 128MB maximum on-board RAM.

Logica Research

512/836-2168, 800/880-0988

LogiCache Accelerator. List price: \$749-\$978. Description: 50MHz 68030. Supports: SE/30, II, Ili, Ili, Ili, Ili. Warranty: 5 years. Notes: FPU available; SE/30, II, Ili, Ili require \$79 adapter.

MacProducts USA

512/499-0888, 800/622-3475

LC 030 Upgrade. List price: \$149-\$199. Description: 20MHz 68030. Supports: LC. Warranty: 1 year. Notes: FPU available.

RailGun 030. List price: \$399-\$599. Description: 16MHz, 25MHz, 33MHz 68030. Supports: Plus, SE, Classic. Warranty: 1 year. Notes: FPU available; dealer installation recommended for Plus (free installation available from vendor for SE, Classic).

MicroMac Technology

714/362-1000

MultiSpeed Accelerator. List price: \$290-\$523. Description: 16MHz, 25MHz, 32MHz 68030. Supports: Plus, SE. Warranty: 1 year. Notes: FPU available; 16MB maximum on-board RAM; requires \$40 adapter.

Mobius Technologies

510/654-0556, 800/523-7933

030 Accelerator. List price: \$399-\$748. Description: 25MHz, 33MHz 68030. Supports: SE, Classic (25MHz only). Warranty: 3 years. Notes: FPU available; maximum 16MB on-board RAM; Classic requires \$50 adapter.

Newer Technology

316/685-4904, 800/678-3726

Variable Speed Overdrive (VSO). List price: \$435. Description: User-adjustable based on RAM speed. Supports: Ilfx, Quadra 700, Quadra 900. Warranty: 2 years. Notes: Uses Mac's own processor and FPU; 50MHz minimum guaranteed speed on Quadra 700 and 900, 30MHz on Ilfx.

NewLife Computer Corporation

613/592-5080, 800/663-6395

Accelerator. List price: \$399-\$499. Description: 16MHz, 25MHz 68030. Supports: Plus, SE, Classic. Warranty: 2 years. Notes: FPU included; 16MB maximum on-board RAM; dealer installation recommended.

Novy Systems

904/427-2358, 800/638-4784

ImagePro. List price: \$549-\$1248. Description: 25MHz, 33MHz, 40MHz, 50MHz 68030. Supports: Plus, SE, Classic. Warranty: 2 years. Notes: FPU included; 16MB max. on-board RAM.

Quik30. List price: \$395-\$828. Description: 16MHz, 25MHz, 33MHz. Supports: Plus, SE, Classic. Warranty: 2 years. Notes: FPU available; 16MB maximum on-board RAM.

Radius

408/434-1010, 800/227-2795

Rocket 25i, Rocket 33. List price: \$1199-\$2499. Description: 25MHz, 33MHz 68EC040. Supports: II series. Warranty: 1 year. Notes: FPU included on Rocket 33; no VM support; 128MB maximum on-board RAM.

TechWorks

512/794-8533, 800/688-7486

Accelerator. List price: \$439-\$1895. Description: 25MHz 68030, 68040; 33MHz 68040; 44MHz 68030. Supports: SE, Classic, LC, LC II, II series. Warranty: Lifetime. Notes: FPU available (included on LC, II series); 16MB max. on-board RAM for SE, Classic; 128MB max. on-board RAM for II series (LC models use system RAM).

Total Systems

503/345-7395, 800/874-2288

Enterprise 030. List price: \$649-\$749. Description: 33MHz 68030. Supports: LC, LC II. Warranty: 2 years. Notes: FPU available; uses system RAM.

Gemini series. List price: \$579-\$1089. Description: 20MHz, 33MHz, 50MHz 68030. Supports: Plus, SE, Classic. Warranty: 2 years. Notes: FPU available; 16MB maximum on-board RAM; dealer installation recommended for Plus and Classic (free installation available from Total Systems).

Intensifier 030. List price: \$149-\$199. Description: 16MHz 68030. Supports: LC, LC II. Warranty: 2 years. Notes: FPU available; uses system RAM.

Magellan 040. List price: \$899-\$2599. Description: 25MHz, 33MHz 68040. Supports: LC, Ilci, Ilsi, Ilfx. Warranty: 2 years. Notes: FPU available (included on Ilci, Ilfx); no VM support; uses system RAM.

Mercury 030 CPU Module. List price: \$229-\$349. Description: 16MHz 68030. Supports: Plus, SE. Warranty: 2 years. Notes: FPU available; 4MB maximum on-board RAM; dealer installation recommended for Plus (free installation available from Total Systems).

Voyager 030. List price: \$799-\$999. Description: 33MHz, 50MHz 68030. Supports: II, Ilx. Warranty: 2 years. Notes: FPU available; uses system RAM.

Cache Cards

Apple Computer

408/996-1010

Macintosh Ilci Cache Card. List price: \$319. Description: 32K. Supports: Ilci. Warranty: 1 year. Notes: Installable by user.

Applied Engineering

214/241-6060, 800/554-6227

QuickSilver CacheIn. List price: \$219-\$293. Description: 32K. Supports: Ilci, Ilsi. Warranty: 1 year. Notes: FPU available.

DayStar Digital

404/967-2077, 800/962-2077

FastCache. List price: \$189-\$449. Description: 32K-128K. Supports: Ilci, Ilsi, Quadra series. Warranty: 3 years. Notes: FPU available for Ilsi.

Universal PowerCache. List price: \$449-\$849. Description: 32K-64K. Supports: SE, SE/30, Classic, LC, LC II, II, Ilx, Ilcx, Ilci, Ilsi, Ilvx. Warranty: 3 years. Notes: FPU available; Ilcx may require free socket installation by DayStar; SE, SE/30, Classic, LC, LC II, Ilx, Ilcx, Ilsi require \$49 adapter.

Logica Research

512/836-2168, 800/880-0988

LogiCache. List price: \$169-\$179. Description: 64K. Supports: Ilci, Ilsi. Warranty: 5 years. Notes: Uses PDS.

Logic-Board Upgrades

These upgrades require installation by an authorized Apple service provider and come with a 1-year warranty.

Apple Computer

408/996-1010

Macintosh Ilfx Logic Board Upgrade. List price: \$1799. Description: Converts II or Ilx to Ilfx. Notes: Requires 4MB of DRAM (not included).

Macintosh Centris 650 Logic Board Upgrade. List price: \$1599 (\$1199 through 5/16/93). Description: Converts Ilvx to Centris 650.

Macintosh Classic II Logic Board Upgrade. List price: \$629. Description: Converts Classic to Classic II.

Macintosh LC II Logic Board Upgrade. List price: \$719. Description: Converts LC to LC II.

Macintosh LC III Logic Board Upgrade. List price: \$599. Description: Converts LC or LC II to LC III.

Macintosh Quadra 700 Logic Board Upgrade. List price: \$1999. Description: Converts Ilcx or Ilci to Quadra 700.

Macintosh Quadra 950 Logic Board Upgrade. List price: \$1899. Description: Converts Quadra 900 to 950.

Math Coprocessor (FPU) Boards

Apple Computer

408/996-1010

Macintosh Math Co-processor. List price: \$79. Description: 16MHz, 25MHz 68882. Supports: Color Classic, LC III.

Applied Engineering

214/241-6060, 800/554-6227

FastMath. List price: \$117. Description: 16MHz 68882. Supports: LC, LC II, Classic II.

DayStar Digital

404/967-2077, 800/962-2077

PowerMath. List price: \$129. Description: 16MHz 68882. Supports: LC, LC II.

Logica Research

512/836-2168, 800/880-0988

Logica FPU. List price: \$99. Description: 16MHz 68882. Supports: LC, LC II.

MacProducts USA

512/499-0888, 800/622-3475

Magic 68882 Math Coprocessor. List price: \$99. Description: 16MHz 68882. Supports: Classic II.

Newer Technology

316/685-4904, 800/678-3726

FPU-882. List price: \$99-\$158. Description: 16MHz 68882. Supports: Classic II, LC, LC II.

PSI Integration

408/559-8544, 800/622-1722

Crunch-It. List price: \$179. Description: 16MHz 68882. Supports: Classic II, LC, LC II.

Second Wave

512/343-9661

Apex LC. List price: \$99-\$199. Description: 16MHz, 33MHz 68882. Supports: LC, LC II.

Sonnet Technologies

714/261-2800, 800/945-3668

CoProCard. List price: \$59-\$79. Description: 16MHz, 25MHz 68882. Supports: Classic II, LC, LC II.

TechWorks

512/794-8533, 800/688-7486

16MHz FPU. List price: \$69. Description: 16MHz 68882. Supports: Classic II.

Power Supplies

Standard power supply is 25.6 watts in the LC and LC II; 150w in the II, Ilx, and Ilfx; 90w in the Ilcx and Ilci; and 95w in the Quadra 700.

Applied Engineering

214/241-6060, 800/554-6227

LC Power. List price: \$102. Description: 38.25w. Supports: LC, LC II.

Quadmation

408/733-5557

ZPS-40LC. List price: \$159. Description: 40w. Supports: LC, LC II.

ZPS-150CXI. List price: \$399. Description: 150w. Supports: Ilcx, Ilci, Quadra 700.

ZPS-230FX. List price: \$399. Description: 234w. Supports: II, Ilx, Ilfx.

SCSI Accelerators

Unless otherwise noted, all the SCSI accelerators listed below are NuBus boards and support the Macintosh II series, the Centris 650, and the Quadra series; offer improved array performance through simultaneous use of both SCSI ports; support DMA; and have no RAM cache. The maximum sustained throughput is listed in megabytes per second (MBps).

ATTO Technology

716/688-4259

Silicon Express. List price: \$765-\$995. MBps: 10-20. Warranty: 1 year. Notes: Silicon Express II and 3D support SCSI-2 Fast.

Conley Corporation

212/797-8824

SHA-100, 200. List price: \$995-\$1495. MBps: 10-20. Warranty: 2 years. Notes: PDS board (supports Quadra 700, 900, 950); SHA100, 200 support SCSI-2 Fast; SHA-200 supports SCSI-2 Wide; neither supports simultaneous SCSI-port use.

Dynatek

416/636-3000

Mach II. List price: \$995. MBps: 10. Warranty: 1 year. Notes: Supports SCSI-2 Fast.

FWB

415/474-8055

SCSI Jackhammer. List price: \$999 (\$799 if purchased with any hammer-Drive). MBps: 20. Warranty: 2 years. Notes: Supports SCSI-2 Fast and SCSI-2 Wide; 128K RAM cache on-board; block-mode transfers.

Lovié Computer Corporation

612/989-6880

Arrow. List price: \$959. MBps: 5.5. Warranty: 1 year. Notes: Supports SCSI-2 Fast and SCSI-2 Wide.

SCSI Bolt. List price: \$959. MBps: 9.2. Supports: Ilfx. Warranty: 4 year. Notes: PDS board (supports Ilfx) supports SCSI-2 Fast and SCSI-2 Wide.

MacProducts USA

512/499-0888, 800/622-3475

Magic SCSI II. List price: \$899. MBps: 10. Warranty: 1 year. Notes: Supports SCSI-2 Fast.

Mass Microsystems

408/522-1200, 800/522-7979

Fast SCSI-2 Board. List price: \$899. MBps: 6. Warranty: 5 years. Notes: Supports SCSI-2 Fast and SCSI-2 Wide; doesn't support simultaneous SCSI-port use.

MicroNet Technology

714/837-6033

SS and SB series. List price: \$1995-\$7995. MBps: 2.3-4.4. Warranty: 1 year. Notes: Supports SCSI-2 Fast; no DMA support.

PLI

510/657-2211, 800/288-8754

QuickSCSI. List price: \$502. MBps: 5.0. Warranty: 5 years. Notes: No DMA support.

Procom Technology

714/852-1000, 800/800-8600

Nu 32 SCSI Enabler. List price: \$995. MBps: 10. Warranty: 1 year. Notes: Supports SCSI-2 Fast and SCSI-2 Wide; block-transfer capability.

Storage Dimensions

408/954-0710

Data Cannon PDS. List price: \$779-\$1499. MBps: 10-20. Warranty: 2 years. Notes: Doesn't support simultaneous SCSI-port use; Data Cannon PDS/Quadra Fast and PDS/FX support SCSI-2 Fast; Data Cannon PDS/Quadra Wide supports SCSI-2 Wide.

Slot Expansion

DGR Technologies

512/476-9855, 800/235-9748

Max. List price: \$349. Supports: LC, LC II. Warranty: 1 year. Description: Expanded case; 40w power supply; internal bay for second hard drive; 3 PDS slots.

Second Wave

512/343-9661

Expanse. List price: \$895-\$2295. Supports: SE/30, II, Ilx, Ilcx, Ilci, Ilfi, Ilfv, Quadra series. Warranty: 1 year. Description: 4 or 8 NuBus or PDS slots.

Sonnet Technologies

714/261-2800, 800/945-3668

Twin Slot LC. List price: \$349. Supports: LC, LC II. Warranty: 1 year. Description: Expanded case; 40w power supply; 2 PDS slots.

Video-Display Enhancement

Unless otherwise noted, display boards listed support 24-bit color and offer QuickDraw acceleration, hardware zoom, extended desktop, and on-the-fly resolution-switching.

E-Machines

408/245-2202, 800/227-2795

ColorLink. List price: \$789. Display size: 13", 16". Supports: II series, Centris 650, Quadra series. Warranty: 5 years. Notes: Offers on-board Ethernet. **Futura.** List price: \$599-\$1299. Display size: 13", 16", 19" (Futura SX supports 19" display size at 8-bit only). Supports: II series, Centris 650, Quadra series. Warranty: 5 years.

Lapis Technologies

510/748-1600, 800/435-2747

ProColorServer 24x. List price: \$699. Display size: 13", 16", 19", 21" at 16-bit only. Supports: SE/30, Color Classic, LC series, II series. Warranty: 1 year. Notes: Doesn't support hardware zoom or extended desktop.

Radiis

408/434-1010, 800/227-2795

PrecisionColor 24X series. List price: \$599-\$1499. Display size: 13", 16", (19", 21" with 24X). Supports: II series, Centris 650, Quadra series. Warranty: 3 years. Notes: Doesn't support

hardware zoom or extended desktop; Ilfi requires \$149 dual-slot/FPU adapter.

RasterOps

408/562-4200, 800/729-2656

24Mx. List price: \$1499. Display size: 13", 16". Supports: II series, Centris 650, Quadra series. Warranty: 3 years. Notes: Offers GWorld; one piggyback-board slot; resolution-switching requires restart.

24MxQ. List price: \$1499. Display size: 13", 16" (19", 21" at 16-bit). Supports: Quadra series. Warranty: 3 years. Notes: No QuickDraw acceleration; Offers convolution technology; Resolution-switching requires restart.

24Sx. List price: \$799. Display size: 13". Supports: II series, Centris 650, Quadra series. Warranty: 3 years. Notes: Offers GWorld; one piggyback-board slot; resolution-switching requires restart.

24XLi. List price: \$2499. Display size: 13", 16", 19", 21". Supports: II series, Centris 650, Quadra series. Warranty: 3 years. Notes: Offers GWorld; one piggyback-board slot; resolution-switching requires restart.

Paintboard. List price: \$999-\$1999. Display size: 13", 16", 19", 21" on some models. Supports: II series, Centris 650, Quadra series. Warranty: 3 years. Notes: Resolution-switching requires restart.

SuperMac Technology

408/245-2202, 800/334-3005

Spectrum/8x24 PDQ. List price: \$999. Display size: 13". Supports: II series, Centris 650, Quadra series. Warranty: 5 years.

Spectrum/24. List price: \$999-\$1849. Display size: 13", 16", 19" (PDQ Plus support 21"). Supports: II series, Centris 650, Quadra series. Warranty: 5 years.

Thunder. List price: \$2399-\$2999. Display resolution: 13", 16", 19", 21". Supports: II series, Centris 650, Quadra series. Warranty: 5 years. Notes: Thunder/24 has one piggyback-board slot.

Other Upgrades

Apple Computer

408/996-1010

Macintosh Centris 610 NuBus Adapter Card. List price: \$99. Supports: Centris 610. Description: Allows users to add NuBus board up to 7 inches long. Installable by user.

Macintosh FDHD Upgrade Kit. List price: \$385. Supports: SE, II. Description: Upgrades standard floppy drive to a SuperDrive (internal version available for \$285).

Macintosh Ilfi 030 Direct Slot

Adapter Card; Macintosh Ilfi NuBus Adapter Card. List price: \$199. Supports: Ilfi. Description: Allows installation of one PDS or NuBus board.

Applied Engineering

214/241-6060, 800/554-6227

AEHD Plus Drive. List price: \$329. Supports: Plus, SE, II (with \$14 adapter). Description: SuperDrive-compatible floppy drive that reads 400K, 800K, and 1.44MB floppies; external only.

QuadraLink, QuadraLink DMA. List price: \$219-\$439. Supports: II, Ilx, Ilcx, Ilci, Ilfi, Ilfv, Ilvx, Centris 650, Quadra series. Description: Adds 4 serial ports. DMA version adds 4 high-speed serial ports. ShadowLAN version lets users share ports across network.

Axion

408/522-1900, 800/829-4661

Axion Switch. List price: \$159. Supports: All Macs. Description: Serial port expander uses one serial port to provide three. Software allows switching between ports.

Connectix Corporation

415/571-5100, 800/950-5880

Compact Virtual 3.0. List price: \$199. Supports: Plus, SE, Classic. Description: Lets Macs without a PMMU use virtual memory.

Mode32. List price: Free. Supports: SE/30, II, Ilx, Ilcx. Description: Allows SE/30 to run in 32-bit mode and access up to 1GB of virtual memory.

Optima/128. List price: \$175. Supports: Any Mac with PMMU. Description: Implements 32-bit addressing under System 6.0, allowing Mac to access up to 128MB of RAM.

Newer Technology

316/685-4904, 800/678-3726

SCSI-II Dart. List price: \$9816-\$34,072. Supports: Any Mac with SCSI port. Description: 128MB-512MB RAM drive with SCSI-2 Fast board.

PLI

510/657-2211, 800/288-8754

SuperFloppy drive. List price: \$399. Supports: Plus, SE, II series. Description: External drive that reads 400K, 800K, and 1.44MB floppies.

TurboFloppy. List price: \$359. Supports: Plus, SE, II series. Description: External drive, reads 1.44MB floppies.

Sixty Eight Thousand

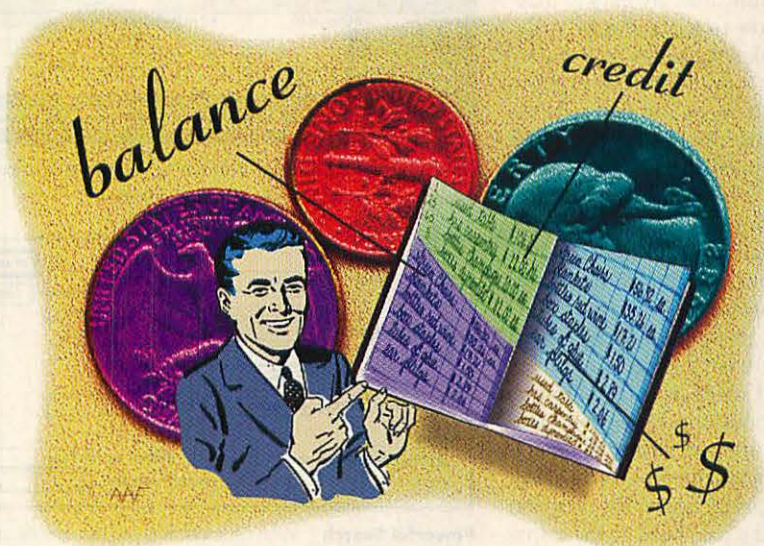
408/438-1777

Dash Workstation. List price: \$2500-\$3000. Supports: Ilfx, Quadra 900, Quadra 950. Description: Combines a 10-drive-bay tower with the Mac's logic board in one case; Ilfx upgrade also increases acceleration to 50MHz. **m**

Money Matters

The bottom line on eight personal-finance programs

by Tom Linden



NOT EVERYBODY IS NATURALLY ORGANIZED, especially when it comes to tracking personal finances. Take me, for example. For years I wrote details of my check transactions on scraps of paper that I stuck in my wallet before entering them in my checkbook. My tax-preparation file consisted of a shoebox into which I deposited receipts, check stubs, and invoices. At tax time, I would dump the contents of the shoebox onto the kitchen table and begin the yearly, harrowing ritual of figuring out where all the money went. For someone who likes puzzles, it would be a lot of fun—the problem is I hate puzzles.

After purchasing personal-finance software last year, my accounting practices changed radically. Now I write checks, chart expenses, and set up for the tax man, all in the time it once took to

scribble on those scraps of paper and record the transactions in my check register. I also have transferred my investment-portfolio information to the Mac, which makes it easier to access and organize information about stocks and mutual funds. From day to day, I know how much I've made (or lost) and what I'm worth. Even before 1992 was history, I knew how much I owed Uncle Sam.

Almost all personal-finance software will help organize your books. The key is to find a product sophisticated enough to meet your needs, but intuitive and simple enough to make personal accounting easy and fun. I looked at Aatrix Software's CheckWriter 4.0 and Aatrix Hi Finance 4.0, Andrew Tobias' Managing Your Money (MYM) 5.0 from MECA Software, DacEasy's DacEasy Light 2.0, Business Sense's Dollars and Sense 5.0, Survivor Software's MacMoney 3.53, and Intuit's Quicken 3.0. All these programs create checking and savings accounts, write checks, reconcile statements, and figure your net worth. The eighth program I evaluated, Reality Technologies' WealthBuilder 2.01 by Money Magazine, tracks your financial portfolio and offers investment strategies but does not have check-writing features.

Tracking Your Pot of Gold

WHAT ALL THE CHECK-WRITING PROGRAMS HAVE in common is that they enable you to follow the money trail. At any point during the year, you can see where your money comes from and where it goes. Every dollar has a source and a destination. For example, if you write a \$75 check for your telephone bill, you subtract that amount from your checking account and assign a \$75 expense to a category you might call "telephone expenses." By doing this simple form of accounting, you can track your money to create a budget, follow your income, or calculate your expenses. It also makes tax preparation a breeze.

Check Writing

CHECK WRITING IS THE MOST BASIC TASK OF ANY personal-finance package. The programs differ in ease of setup and operation and the ability to track your income and expenses.

Quicken is the best-selling personal-finance program, probably because simple tasks are easy to master. A beginner can learn how to write checks, make deposits, and reconcile bank statements in a matter of minutes. I like Quicken's graphic presentation. The Quicken check template looks just like a check, and the Quicken check register looks just like those registers where you once dutifully recorded your checks (see "Familiar Look"). With any of the check-writing programs, you no longer need a handwritten check register. One cautionary note, however: If you write checks away from your computer, make sure you transfer the information to your personal-finance program as soon as possible. (I carry a piece of paper in my wallet to jot down the check numbers and amounts for all checks I write away from home.)

If you are concerned about other people accessing your checking accounts or other financial records, you should note that all the programs except MacMoney offer password protection at the program level. Some also let you add a password at the transaction level, to restrict who can modify transactions.

Like all its competitors, Quicken automatically enters the date of your check. Then you simply tab to the check number space, where hitting the plus (+) key advances the check to the next number. To complete the check, you tab to payee, payee's address (which you need if you're printing checks and using window envelopes), amount of check, memo (if any), and expense category.

Quicken does not require you to allocate an expense to a specific category. This may seem great to the newly initiated, but if you track your expenses to prepare for tax day, it's freedom enough to hang yourself. Of course, you can keep tabs on your expenses simply by assigning each debit to an expense category. Another major problem with Quicken is that the list of expense categories appears in a separate window from the check register. So if you need to look at the list of categories to decide where to allocate your expense, that adds a step to the process.

If you do categorize your expenses (which I strongly recommend), MYM, MacMoney, and CheckWriter make your task much easier. None of these programs require a separate window for categorizing expenses (see "One Window Does All"). Categories appear in the same window as the check

Sample Account: Register

DATE	NUMBER	MEMO	DESCRIPTION	CATEGORY	PAYMENT	DEPOSIT	BALANCE
12/2		Opening Balance				1,000.00	1,000.00
1992			(Sample Account)				
12/2	101	Jim Smith's Market		50.00			950.00
1992			Groceries				
12/2	102	Rhonda's		25.00			925.00
1992			Hair Styling				
12/2	103	Bob Jones Services		62.00			863.00
1992			Janitorial				
12/2	104	Ron's Plumbing Service		83.25			779.75
1992			Services				
12/2	105	The Stationery Store		26.23			753.52
1992			Office				
						Current Balance:	\$758.02

Save Restore

Familiar Look One reason Quicken is so easy to use is that it has the look-and-feel of a standard check register.

Write Checks

Check #: 881 Date: 12/2/92

Current Balance: \$8,156.99

Search: Page: Smith's Office Supplies Amount: \$27.05

Twenty-Seven and 05/100 Dollars

Memo: Tom Linden

Account List: Student Loan, Subscriptions, Supplies (R), Supplies (TV), Supplies (TV)/Media, Taxes, Fed Inc - Mtd

To Account: \$ To: Memo: Smith's Office Supplies

Eraser Save as Recurring Done Record

One Window Does All With MYM, you can write a check and categorize the expense, all in the same window.

"Find" Report Options:

☒ Description Contains California Power

☐ Memo Contains

☐ Check number Is exactly

☒ Amount Is over 90

☒ Date Is after 1/1/93

☒ Budget category Contains Utilities

Options: ☒ Multiple file search Output to: Screen

Report options: max

Preview Cancel

Powerful Search With CheckWriter, you can specify up to six criteria to find previous check transactions.

template or in a separate window alongside the check. As with Quicken, you simply click or double-click on the expense category to record it in the register. All the programs reviewed here let you add or delete expense categories so you can tailor record-keeping to your financial and tax needs. But the various programs handle expense categories differently.

Doing the Splits

SAY YOU WRITE A CHECK FOR \$1000 TO MASTER-Card for your February bill and you want to itemize the expense categories for each of 15 different transactions on the bill. You can't do that with DacEasy Light, MacMoney, CheckWriter, or Hi Finance, which limit the number of splits per transaction to 5, 8, 10, and 10, respectively. (Survivor Software says it will add support for 25 splits in MacMoney 4.0, which was scheduled to ship in the second quarter of 1993.) A large number of splits, however, is not a problem for Dollars and Sense, which can accommodate 23 splits per check; or for Quicken and MYM, both of which allow an unlimited number of expense distributions for each check.

Say good-bye to needless reentering of recurring data and hello to automatic bill reminders

Electronic Payments

BOTH QUICKEN AND MYM ALSO OFFER A DIRECT link to CheckFree (call 800/882-5280 for information and sales), CheckFree Corporation's online bill-payment service that makes electronic payments or issues paper checks in your name to any number of payees you designate. The monthly charge is \$9.95 for the first 20 payments and \$3.50 per additional 10 or portion thereof. (In most cases, the service, which you access via modem, is more expensive than printing and mailing your own checks.) Besides being offered as a module within Quicken and MYM, CheckFree also has stand-alone software, CheckFree 2.0. When I used CheckFree's software to send an electronic payment, the check was issued promptly and accurately.

Several banks also offer online bill-payment and banking services. The Bank of America Homebanking service (800/792-0808) works with Lundeen and Associates' (800/255-0996) Express CheckIt software. Wells Fargo On-Line (800/729-3557) lets you access your bank accounts via Prodigy or through software licensed from Chemical Bank of New York, which offers a similar service to its customers and to several banks nationwide.

Two warnings to heed if you use an electronic payment service: If a merchant does not accept electronic transfers, the service must print a check and mail it, which takes more time than writing and mailing it yourself. Also, electronic payments can be more difficult to trace than checks since you typically get monthly statements instead of canceled checks.

Reconciling the Differences

ALL THE REVIEWED CHECK-WRITING PROGRAMS will reconcile your checks, although for pure ease of operation, Quicken is the winner here. With Quicken, you simply enter the new balance from your check statement, add any interest and service charges

not already noted in your electronic register, and mark cleared transactions from your bank statement. The software automatically reconciles the account or tells you how much you're off. CheckWriter, Hi Finance, MacMoney, and MYM do the job almost as easily, although I found Quicken to be more intuitive, perhaps because graphically it's so closely modeled after a standard check-writing register.

All the reviewed check-writing programs handle recurring bills such as monthly mortgage or rent payments. For this job, I found CheckWriter, MYM, and Quicken required the least effort. Once you've recorded the initial transaction with these check-writing programs, selecting the payee's name in a database will enter the entire transaction on your check. All the programs also let you have more than one recurring transaction to the same payee; in MYM and Quicken, you can use the memo field in the recurring-transaction window to differentiate between a car insurance payment and a house insurance payment to the same company. Say good-bye to needless reentering of recurring data. Also, these programs remind you when a bill is due.

The same three programs—CheckWriter, MYM, and Quicken—also offer the best search functions; you can call up previous transactions by criteria such as payee, memo, or expense category. CheckWriter's search function is the most powerful and requires the fewest steps: you can use the Find command to define your search by payee, memo, check number, amount, date, budget category, or any combination of those. Say you're charting your utility expenses and want to find out when your gas and electric bill topped \$90 a month. In a dialog box, you simply name the payee under Description, specify "over \$90" in the Amount box, and indicate the date range and/or budget category you want (see "Powerful Search"). CheckWriter then locates all transactions that meet your search criteria. Check-

Taking Stock of Online Services

If you want a seamless online link for stock, bond, and mutual-fund quotes and information, WealthBuilder 2.0 by Money Magazine is the easiest option. If you already subscribe to an online service such as CompuServe or America Online, you can save money by using Aatrix's Hi Finance to download quotes directly from your service. Or you can reach the online services yourself and transfer the data

manually to your investment portfolio. However, that might take a lot of time if you have a large number of holdings. Leading services with online financial data include

- America Online, 800/827-6364; \$7.95 per month including two hours online
- CompuServe, 800/848-8199; \$8.95 per month for standard services, with unlimited quotes
- Dial Data, 718/522-6886; \$15

minimum per month, with quotes 3.5 cents to 1 cent each, depending on volume

- Dow Jones News/Retrieval Service, 800/522-3567; \$25 per month for unlimited quotes
- Prodigy, 800/776-3449; \$14.95 per month for unlimited quotes

For other financial reports and stock analyses, prices vary.

The best clearinghouse of information for the online inves-

tor is the nonprofit American Association of Individual Investors (AAII, 312/280-0170). It publishes a newsletter, *Computerized Investing*, 5 times a year and a 500-page book, *The Individual Investor's Guide to Computerized Investing*, every November. AAIL membership costs \$49 a year. The newsletter subscription, which includes the book, is \$30 a year for AAIL members, \$60 a year for others.

Writer also allows you to search multiple checking accounts at the same time and to specify whether you want to see cleared checks, uncleared checks, or both. CheckWriter is the only program that displays the results of your search in your account register; other programs perform similar searches but display the information in report form that requires a separate window and takes additional time.

Budgeting the Bucks

BUDGETING IS RARELY FUN, BUT PERSONAL-FINANCE software makes this onerous job a little easier. All the reviewed personal-finance programs let you set up monthly budgets by expense categories, which then can be compared with actual spending. MYM and MacMoney's month-by-month displays of actual versus budgeted expenses are particularly easy to follow, making it very clear when you are deviating from your budget (see "Over Budget"). If you bust your self-imposed limits, CheckWriter offers an optional warning that gives you one final chance to cancel your check transaction before descending into the depths of profligate spending. Sinners beware.

Check Printing

BESIDES CHARTING YOUR EXPENSES FOR both budgetary and tax review, personal-finance software can eliminate the drudgery of check writing. You can print all, none, or some of your checks. Since most of my transactions occur away from my office and computer, I still prefer to hand-write my checks and record the information later in my electronic check register. Sooner or later, I'll probably relent and use my printer. Personal checks issued by my bank cost about 5 cents apiece for an order of 200. Checks for laser or ink-jet printers range from 11 cents to 20 cents apiece for quantities up to 500. If you don't want to get hooked into buying higher-priced computer checks, CheckWriter allows you to print on a personal checkbook check; you can move data fields for date, payee, amount, and memo to any position you desire on the check. Using the check-design software that comes with CheckWriter, I printed a personal check on my HP DeskWriter. As you can judge from "Print on Your Own Checks," it worked well. I had to feed the checks one at a time, but I found the process no more difficult than printing individual envelopes. Unique among the personal-finance packages, CheckWriter also allows you to use plain paper to print checks with an MICR (Magnetic Ink Character Recognition) account coding that can be read by banks. To do this, you must have a laser printer. For \$399, Aatrix provides a starter kit that includes a special magnetic toner cartridge, MICR fonts, 24-pound paper for 1000 checks, an alignment template, and check software, as well as software for printing blank checks.

Only DacEasy Light allows you to print invoices, although Survivor Software offers an add-on package for MacMoney that provides this function.

A Taxing Proposition

BEYOND EASING THE HASSLES OF CHECK WRITING, account reconciling, and budgeting, personal-finance

Personal Supplies			
Month	Budget	Actual	Difference
January	45.00	98.42	-53.42
February	45.00	26.28	18.72
March	40.00	36.56	3.44
April	50.00	54.34	-4.34
May	0.00	0.00	0.00
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00
September	0.00	0.00	0.00
October	0.00	0.00	0.00
November	0.00	0.00	0.00
December	0.00	0.00	0.00
Total	180.00	215.60	-35.60
May	0.00		

Over Budget With MacMoney, it's easy to see when you exceed your budget.

AATRIX SOFTWARE, INC.
PH. 1-800-426-0864
420 BRUCE AVENUE
GRAND FORKS, ND 58201

NO. 11/1/92

PAY TO THE ORDER OF California Water Services Co. \$ **25.27

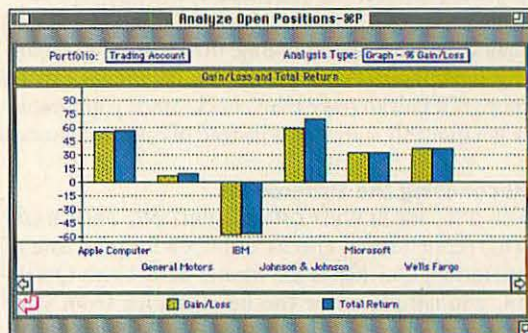
*****Twenty five and 27/100***** DOLLARS

THE BANK OF YOUR CITY
YOUR CITY, USA, TEXAS
MEMO October Water Bill

10000678941 123456789

NOT NEGOTIABLE
SAMPLE-VOID
DO NOT CASH

Print on Your Own Checks Forget about ordering expensive computer checks. With Aatrix CheckWriter, you can print on your personal bank check. I printed this one with my HP DeskWriter.



Tracking Your Gains MYM's bar graphs show how your stock portfolio has fared.

software's biggest advantage is simplifying tax preparation to help you save on your annual contribution to Uncle Sam. The standout performer here is MYM. Without relying on separate tax software, MYM can take your expenses at any point during the year and estimate what you owe the federal government. The MYM Tax Estimator fills out an abbreviated Form 1040 and Schedules A, B, C, D, E, F, and SE. For those who have to pay estimated taxes or just want to know where they stand, the tax estimator is a wonderful function. In one hour in early November, I projected my tax liability for the coming April 15 and determined whether I owed estimated taxes. The MYM tax estimator also can play the "what-if" game. What if my book earns a \$50,000 advance? What would my taxes be then? What if the stock market crashes and I have to sell my stocks at

You can cancel a check transaction before descending into the depths of profligate spending

rock-bottom prices? What would that do to the capital gains taxes I anticipated earlier in the year? The "what-if" game opens the door to countless hours of intriguing and entertaining scenarios. What if Ed McMahon knocks on my door and gives me a million dollars? What if I spend all my time playing "what-if" games?

WealthBuilder also includes a tax estimator. Because WealthBuilder does not offer check-writing capabilities and therefore cannot track your daily

tax-deductible expenses, I found its tax estimator to be of limited use. If you want to use it, you have to transfer all your data from another personal-finance program. If you go to that much trouble, why not go all the way and export the data to a full-fledged tax-preparation program like ChipSoft's MacInTax (619/453-8722, federal version \$79.95, state version \$49.95), or MECA's TaxCut (203/256-5000, Federal version \$79.95, state version \$49.95)? If you have Microsoft Excel 2.2 or a later version, another tax-

YOUR GUIDE TO PERSONAL FINANCE

Product	Aatrix HI Finance 4.0	Andrew Toblas' Managing Your Money 5.0	CheckWriter 4.0	DacEasy Light 2.0	Dollars and Sense 5.0	MacMoney 3.53	Quicken 3.0	WealthBuilder 2.0 (by Money Magazine)
Company	Aatrix Software	MECA Software	Aatrix Software	DacEasy	Business Sense	Survivor Software	Intuit	Reality Technologies
Telephone	701/746-6801; 800/426-0854	203/256-5000; 800/288-6322	701/746-6801; 800/426-0854	214/248-0305; 800/322-3279	801/261-7800; 800/377-4954	310/410-9527; 800/369-4691	415/852-9696; 800/624-8742	215/277-7600; 800/346-2024
List price	\$129	\$79.95	\$79	\$49.95	\$99.95	\$119.95	\$69.95	\$69
Checking account	●	●	●	●	●	●	●	○
Automatic check numbering	●	●	●	●	●	●	○ ¹	NA
Number of expense distributions per check	10	unlimited	10	5	23	8	unlimited	NA
Electronic bill transfer	○	●	○	○	○	○ ²	●	○
Prints checks	●	●	●	●	●	●	●	○
Prints personal checkbook checks	●	○	●	○	○	○	○	○
Exports to Excel and MacInTax	●	●	●	●	●	●	●	○
Exports text files	●	●	●	●	●	●	●	○
Imports Quicken 3.0 transactions	●	●	●	○	○	○	●	○ ³
Prints invoices	○	○	○	●	○	○ ⁴	○	○
Program access password	●	●	●	●	●	○	●	● ⁵
Transaction modification password	●	○	●	○	○	○	●	○
Retirement planning	●	●	●	○	○	●	○	●
Generates reports	●	●	●	●	●	●	●	●
Amortized loan schedule	●	●	●	○	○	●	○	○
Income vs. expenses	●	●	●	●	●	●	●	●
Net worth	●	●	●	●	●	●	●	●
Pie charts	● ⁶	●	● ⁶	○	○	●	○	●
Downloads stock and mutual-fund quotes	● ⁷	○	○	○	○	○	○	●
Stock and mutual-fund database	○	○	○	○	○	○	○	●
Calculates stock splits	●	●	○	○	○	○	○	●
Analyzes open positions for each security	●	●	○	○	○	○	○	●
Estimates taxes	○	●	○	○	○	○	○	●

● = yes; ○ = no; NA = not applicable. ¹ Must hit plus (+) key. ² Imports CheckFree data. ³ Imports budget report only. ⁴ Add-on module required.

⁵ Required not optional. ⁶ Black-and-white only. ⁷ Except for options quotes.

software option is Heizer Software's Heizer Tax Series (510/943-7667, \$49 plus \$19 per state form).

Import and Export

ALL THE SOFTWARE PACKAGES EXCEPT WEALTH-BUILDER can export data in tab-delimited format, which can be read by most spreadsheets and tax-preparation programs.

Transferring your financial transactions from one program to another is a tedious process that discourages most people from shifting software in midyear, if ever. Fortunately, Quicken is emerging as a common language among personal-finance software users. Within Quicken, you can use the import function to transfer transactions from one Quicken file to another. You can also export transactions from Quicken 3.0 to CheckWriter, Hi Finance, and MYM. I transferred almost a year's worth of transactions from two accounts in Quicken 3.0 to both CheckWriter and MYM. The data-transfer from Quicken to MYM was perfectly smooth. The Quicken transfer to CheckWriter produced only a few hitches. CheckWriter incorrectly read a few Quicken transactions where I had split expenses into two or more categories. CheckWriter also had trouble transferring a few budget items. Unfortunately, MacMoney 3.53 does not import Quicken 3.0 data, although Survivor Software says MacMoney 4.0 will have that capability. WealthBuilder can import budget data from both Quicken 3.0 and MYM 5.0 but does not support the importing of check-transaction data or stock-portfolio information. That oversight cost me hours in tedious data entry time when I wanted to transfer my stock and mutual-fund transactions from MYM to the more sophisticated investment-portfolio program in WealthBuilder.

Managing Your Portfolio

IF YOU OWN SECURITIES AND YOU WANT TO track them, MYM, Hi Finance, and WealthBuilder have the most to offer. For example, they can track the stock and mutual-fund shares that you own as well as the ones that you've sold, known in the trade as analyzing open and closed positions.

MYM offers an investment menu where you can record your security purchases or sales, stock splits, dividends, and price updates. MYM also computes your percent gain or loss in both numerical and bar graph form (see "Tracking Your Gains"). A pie chart depicts your stock, bond, and cash diversification. You can also compare your individual stock or portfolio performance against any market index you choose. However, you have to find the market-index information from your own sources and manually enter the numbers. For the serious investor, a big downside of MYM is its lack of an online linkup for automatically updating stock, bond, or mutual-fund prices—a feature that MECA has offered for some time in its DOS version of MYM.

Unlike MYM, Hi Finance downloads stock and mutual-fund prices through whatever online service you choose (see "Taking Stock of Online Services"). The program offers the same check-writing and budgeting features as its cousin, CheckWriter, but also creates accounts specifically set up for stocks, bonds, annuities, and mutual funds. A downside of Hi

Research Databases

☒ Mutual Funds
☐ Stocks
☐ Corporate Bonds

?

View By: Performance Profile

Sort By: Fund Name

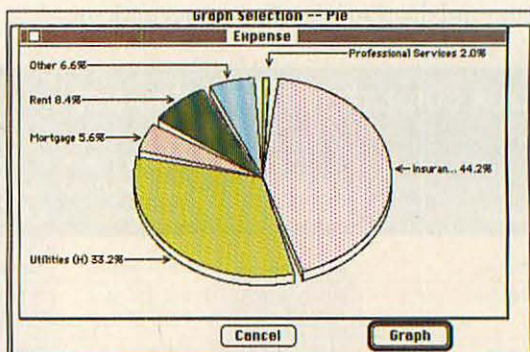
☐ Show Only
☒ Show Only

Sort Order:

Double Click to view the Report Card.

<input checked="" type="checkbox"/> Fund Name	Symbol	Type	Rating	Risk Level	Beta	4-Qtr. Yield
44 Wall Street	FVLEK	AD	4	0.77	0.0%	
44 Wall Street Equity	FVLEK	AD	4	0.70	0.0%	
AAL Bond	AAROK	CQ	3	0.94	6.6%	
AAL Capital Growth	AALGX	D	4	0.89	1.9%	
AAL Municipal Bond	AALMX	MD	3	0.71	5.6%	
AARP Capital Growth	ACOFX	D	4	1.25	0.7%	
AARP GROWTH & U.S. Treasury	AGNFX	GO	4	0.68	7.0%	
AARP Growth & Income	AGIFX	DI	4	0.78	3.3%	
AARP High-Quality Bond	AGBFX	CQ	4	1.05	6.3%	
AARP Insured Tax-Free General Bond	ATOTX	MD	5	0.95	5.3%	
ABT Emerging Growth	ABEXK	AD	5	1.36	0.0%	
S & P 500				1.00	3.0%	

Mutual-Fund Screening WealthBuilder can filter 2500 mutual funds by 10 criteria to help you with buying decisions.



Cutting Up the Pie If you want to see where the money went, MacMoney offers the best-looking pie charts of all the check-writing programs.

Finance is its inability to track percent gain, percent loss, and total and annualized return—features found in MYM and WealthBuilder.

Two features that set WealthBuilder apart from its competitors are its extensive database of market performance and its smooth downloading of quotes for stocks, mutual funds, and options. For automatic price updating, you only need a modem and the willingness to pay a monthly fee. For \$9.95 per month through the Gold Plan, you have online access to a research database from Morningstar of more than 2500 mutual funds and 15-minute delayed stock quotes from the New York and American Stock Exchanges and NASDAQ. For \$17.95 per month through the Platinum Plan, you get an additional online database from Standard & Poor's, which follows more than 5000 stocks and 6000 bonds. The service gives you 59 data points on each stock, including high and low price, price/earnings ratio, and cumulative returns. However, because of licensing agreements between Reality Technologies and the providers of online stock and mutual-fund quotes, WealthBuilder cannot export downloaded quotes into another program, such as a spreadsheet or word processing program. If you want to follow prices of a particular stock or mutual fund over time, you must print copies of the data. The lack of export capability is a significant downside to WealthBuilder.

To help with your buying or selling decisions, WealthBuilder can sort stocks by 16 criteria including yield; price/earnings ratio; price/book ratio; volatility; profit margin; and cumulative return over year-to-date, 3-year, and 5-year periods. It can sort

The tediousness of transferring transactions from one program to another discourages software changes

bonds by 7 parameters including maturity date, current yield, and S & P rating. The program can rank mutual funds by 10 categories including year-to-date, 3-year, and 5-year returns; risk; and volatility (see "Mutual-Fund Screening"). WealthBuilder also features a color pie chart that shows the allocation of your investments among equities, bonds, metals, and cash. Be forewarned that WealthBuilder is a hard-drive space hog requiring up to 10.4MB for the Platinum Plan. If you run out of room, jettisoning the help, animation, and tutorial files helps relieve the space crunch by 1.7MB.

Reports

ALL THE PERSONAL-FINANCE PROGRAMS THAT I evaluated generate net worth and income versus expenses reports. Only MYM, MacMoney, and WealthBuilder offer color pie charts, line graphs, and bar graphs (see "Cutting Up the Pie"). CheckWriter and Hi Finance create only black-and-white pie charts, which are difficult to read. (Aatrix says it will add color support to both CheckWriter 5.0 and Hi Finance 5.0, scheduled to ship in the second quarter of 1993.) If you want to print amortized loan schedules personalized for your loan's interest rate, principal, and term, only CheckWriter, Hi Finance, MYM, and MacMoney offer this feature. It's a toss-up as to which program produces the best-looking reports, but the winner for the most obnoxious report is WealthBuilder, which blatantly advertises itself on every report you print.

Financial Planning

WEALTHBUILDER OFFERS THE MOST ROBUST financial-planning features, providing tools to help plot your investment strategy for college education, a dream home, or retirement. Flexible assumptions account for inflation and life expectancy. A time line graphically depicts how your progress measures up to your financial goals. MYM offers a similar financial-planning module with bar graphs to chart how you are doing. MacMoney, CheckWriter, and Hi Finance calculate the savings required to meet your

financial goals. If you are looking for the quick way to Easy Street, CheckWriter can randomly generate up to 20 "lucky" numbers for use in a lottery (guarantee on winnings not included).

Technical Support

MOST OF THE PERSONAL-FINANCE SOFTWARE packages that I evaluated include unlimited free support. The exceptions are DacEasy Light and Dollars and Sense, which charge \$25 and \$89.95 per year, respectively. The Dollars and Sense package includes free upgrades during the year and two newsletters. MYM includes free unlimited technical support, but the \$49.95 Plus Plan includes an annual upgrade, extended tech-support hours during evenings and Saturdays, a money-related book "chosen" by Andrew Tobias, and a quarterly MYM newsletter.

I called the free technical-support lines for CheckWriter, Quicken, MYM, MacMoney, and WealthBuilder and got prompt service from all except for MECA's MYM. At MECA, only DOS technicians were immediately available, but a Macintosh-trained technician called back twice within the next 24 hours, once reaching my answering machine and the second time getting through to me. Intuit's Quicken technicians were helpful in confirming that a color flash that occurs when I launch Quicken on my NEC MultiSync 3FGx monitor results from a Quicken incompatibility problem with 16-color displays. A technician I spoke with says Intuit is aware of the problem but does not have a fix at this time. Aatrix's CheckWriter technicians were available on several occasions when I called, and I was never put on hold.

Summing It Up

NO INDIVIDUAL PROGRAM WILL SATISFY ALL YOUR personal-finance needs. If you simply want an electronic version of your old checkbook with check-printing capabilities, Quicken and MacMoney are adequate, but MYM and CheckWriter are my favorites—they're smooth, fast, and easy. I especially like CheckWriter's ability to print on personal checkbook checks and its powerful search capabilities. If your primary interests are financial planning and portfolio management, consider WealthBuilder because of its strengths in those areas. Aatrix's new entry, Hi Finance, tries to take the middle ground with its combined check-writing and stock-price-updating capabilities, but it's far less powerful than WealthBuilder. If you want to settle on one program for both check-writing and investment management, then currently MYM is your best choice. MYM will be even better if and when it includes online stock and mutual-fund price updating. ■

TOM LINDEN, M.D., the anchor of "Physicians' Journal," which airs Sundays on Lifetime Television, still stores his expense receipts in shoeboxes, but for his new company, MedWorld Productions, he got a bigger one.

MW

EDITORS' CHOICE

CheckWriter 4.0 This well-designed program is easy to use and has powerful search and check-printing capabilities. Technical support is superb. Company: Aatrix Software. List price: \$79.

Andrew Tobias' Managing Your Money 5.0 Short of downloading stock and mutual-fund quotes, this program does everything from writing checks to analyzing your stock portfolio to estimating your taxes. A solid package of software. Company: MECA Software. List price: \$79.95.

Read my

THE BOTTOM LINE

The HP ScanJet IIc sets a new standard for affordable color scanners. Its engine is fast and well-engineered, and HP's innovative color-calibration software makes hassle-free, "true"-color scans a reality. Prices at less than \$2,000, the HP ScanJet IIc is a best buy in its class.

It's blazingly

The HP ScanJet IIc uses a one-pass scanning method that makes it one of the fastest color scanners we've seen. It also provides time-saving color previews that dynamically display any changes you make to the scan, such as exposure, hue, and saturation modification.

HP combines its excellent color-calibration technology with one of the best scanning engines we've seen. Our tests for resolution, consistent tracking of the scan head, and color accuracy showed the HP ScanJet IIc to be a top performer. In addition

TOP-NOTCH HARDWARE TEAMED WITH INNOVATIVE SOFTWARE MAKES HP'S NEW COLOR SCANNER A WINNER.



1992 Diamond Awards

For an all-around scanner offering high-quality color and black-and-white images, true 400-dpi resolution, and good basic scanning software, HP's ScanJet IIc can't be beat.

Hewlett-Packard's ScanJet IIc sets a new standard for affordable desktop gray-scale scanners. From

Top honors in every s

"We were extremely impre

clips.

fast!

and black-and-white, etc.
ScanJet IIP is an exceptional product. The scanner is just 16 inches long by 11 inches wide by 4 inches high.

WINNING COMBINATION

To test the HP ScanJet IIC, we used the same set of tests we used for our most recent color-scanner lab report. The results showed **HP's new scanner to be the best in its class in both hardware and software.** The **ScanJet impresses from the moment you open the box.** Other

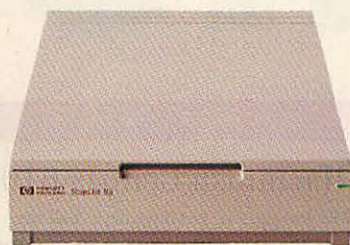
scanners use a removable screw that locks the scan head for shipping, but HP uses a locking lever that's built into the scanner itself. There's no screw to lose, and the lever is so easy to use that you'll find yourself locking the scan head more often, thereby increasing its life span.

ner category.

ed..."



HP ScanJet IIC



HP ScanJet IIP

We'd hate to brag. So we'll let the Mac press do it for us.

Macworld awarded both the HP ScanJet IIC and IIP their *World Class Award*, and named the HP ScanJet IIC as the *Best Color Scanner* for 1992, and the HP ScanJet IIP as the *Best Black & White/Gray-Scale Scanner*. While *MacWeek* gave their prestigious *Diamond Award* to the HP ScanJet IIC.

Speed. Simplicity. And accuracy were all applauded. It's no wonder. HP's single-pass scanning delivers both lightning-fast speed and precise color registration. TWAIN support allows scanning without having to switch between applications. And HP AccuPage technology with 400-dpi resolution can tackle the toughest OCR challenges. What's more, capabilities this advanced have never been this affordable. List price on the HP ScanJet IIC is just \$1,599. The HP ScanJet IIP is just \$879. And right now, the HP ScanJet IIC includes Adobe™ Photoshop LE.

Impressed? Don't just take our word for it, or even the Mac press's. Attend one of our scanning seminars that will be held April through September, 1993. To find out more about the HP ScanJet IIC and IIP or seminars in your area, call 1-800-SCANJET, Ext. 7364.* And judge for yourself.



HEWLETT
PACKARD

Reviews

IN THIS ISSUE: LaserWriter Pro 600 and 630, WordPerfect Works, Adobe Photoshop, 4D Server, artWorks, AppleCD 300, StyleWriter II, Peace of Mind, Infinity Optical 3.5, and more

Macintosh Computers

Macintosh Centris 610

PROS: Inexpensive; has drive bay; small size saves desktop space; offers built-in Ethernet and video-display circuitry. **CONS:** NuBus expansion limited to one 7-inch board that requires a \$99 adapter; math coprocessor upgrade is expensive. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** \$1859 for base model (4MB of RAM, 80MB hard drive, 512K of video RAM).



Macintosh Centris 650

PROS: Moderately priced; fast 040 system; has three expansion slots and one drive bay; has built-in Ethernet and video circuitry (except for base model); has built-in math coprocessor (except for base model). **CONS:** One of the three NuBus slots is blocked if PDS is used. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** \$2699 for base model (no math coprocessor, 4MB of RAM, 80MB hard drive, 512K of video RAM).



AN 040 ON EVERY BUSINESS DESKTOP. That's the promise of the new Centris Macs, the slim-design 610 and the full-size 650. Apple has said that it intends to compete with the low-price Windows PCs that dominate the business market, and the Centrises prove Apple is serious.

For about the same price as a Mac IIci or IIvx, you can now buy a Centris 610, which is 1.8 times as fast (see "Rating the Centrises' Speed"). Spend a thousand dollars more and you get a desktop Mac (the 650) as powerful as the recently discontinued Quadra 700. *Macworld* previewed these new Macs in the April 1993 issue



("Centris 610 and 650") after looking at prerelease models. We've now spent time with the shipping versions and are pleased to see that what you can buy is as impressive as what we first saw.

Expansion Pros and Cons

IN FORM, THE CENTRIS 610 CARRIES ON the role of the discontinued Mac IIci: a small computer that sacrifices expandability for lower cost. The 650 likewise carries on the tradition of the discontinued IIci: a large computer that can handle almost any business expansion need.

This means that the Centris 610 has only one NuBus slot—one limited to 7-inch NuBus boards, of which very few were shipping at press time—that requires an optional \$99 adapter. The 650 has three NuBus slots, enough for most users. It also has a Processor Direct Slot, but if that slot is used, it blocks a NuBus slot, and vice versa.

Trading limited expansion for a lower price is fine, but doing it in so limiting a

way is not. For example, while I would prefer a 12-inch board for the Centris 610, I realize that means the case would have to be 5 inches deeper. But then to have to pay \$99 more just to use a NuBus board when I find one that fits adds insult to injury.

Both Centrises come with a 5.25-inch drive bay in which you can add a SyQuest, CD ROM, or other storage device.

Processing Power

THE CENTRIS 610 IS LESS POWERFUL than the 650: the 610 uses a 20MHz 68LC040 (the LC means there is no internal math coprocessor) compared with the 650's 25MHz regular 040. (The base 650 model—with 4MB of RAM and an 80MB hard drive—also uses the LC040.)

The processors' speed difference translates into a 20 percent difference in performance: a Centris 650 is about 2.5 times as fast as a IIci, while a Centris 610 is about 1.8 times as fast. Both are speedy enough for most business users.

The Centris 610 can be made to run as fast as a 650, although this is not an Apple-sanctioned upgrade. If you replace the clock crystal (about \$4) that controls the 610's processor with a 25MHz version, the 610 will run at the same speed as the 650. I know several dealers who have done this. Apple has not tested such a system, but engineers recommend that you add a heat sink to a souped-up 610. (This is basically the approach used by Newer Technology's VSO overdrive products for the IIcx and Quadra 700. There is a debate over whether this approach wears out the processor faster because of the extra heat generated, but it is fairly common among PC makers.)

Math Processing Trade-Offs

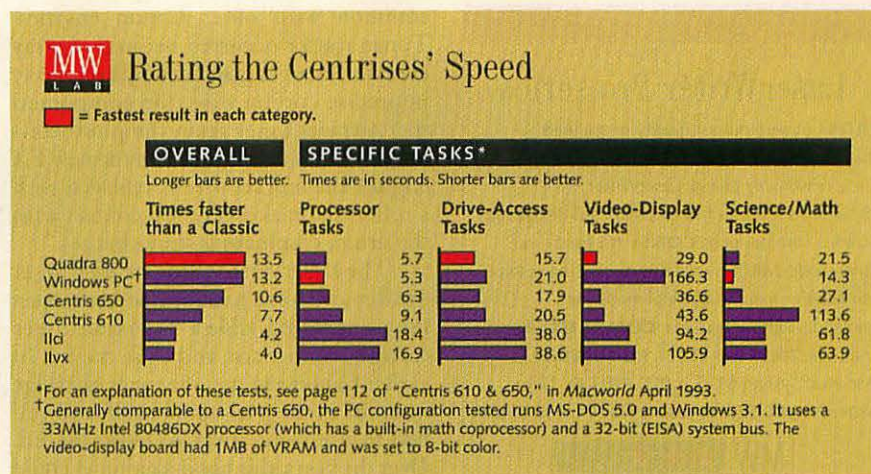
THE 610'S (AND BASE 650'S) LACK OF A math coprocessor won't affect most people. The math coprocessor is used for rendering, certain image transformations, trigonometric calculations in science and engineering, and similarly high-powered floating-point calculations.

My only quibble over the lack of a math coprocessor is that there is no slot in which to add a coprocessor later—instead, you must replace the LC040 processor with a regular 040—figure about \$400, and make sure you include a heat sink. Fortunately, the processor is socketed, so it's not hard to do. To be fair, Motorola doesn't offer 040s on which a coprocessor can be added later, as Intel does for its 80486SX processors (whose internal math coprocessor is disabled)—but Intel's add-on coprocessor also doubles the processor's internal speed.

Better Memory

BOTH CENTRIS MACS USE THE NEW 72-PIN SIMMs developed originally for IBM PS/2s, Compaq DeskPros, and other premium-brand DOS PCs. (This means you can swap SIMMs among these machines—great for multiplatform corporations.) Compared with the standard 30-pin Mac (or DOS) SIMMs, expect to pay about \$15 more per megabyte (about \$190 for a 72-pin 4MB SIMM compared with \$125 for a 30-pin version), and expect an initial shortage of these SIMMs.

The 72-pin SIMMs offer worthwhile advantages, however. First, they eliminate slot and bank rules. With 36-pin SIMMs, you need to have two SIMMs in a bank (and more on some Macs). With 72-pin SIMMs, a slot is a bank, so gone are those arcane placement rules. Just put SIMMs of whatever capacity you want in any slot you want. One caveat: make sure your SIMMs are 4MB or greater in capacity, since the Centris don't support smaller-capacity SIMMs.



The use of these 72-pin SIMMs also means that Apple can put fewer slots on the logic board (there are two on the 610 and four on the 650), which saves engineering and production costs. Even with just two slots, you can get 68MB in a Centris 610 by adding two 32MB SIMMs (about \$2000 each) to the 610's 4MB of base RAM. You can get 136MB in a Centris 650 by adding four 32MB SIMMs to its 8MB of base RAM. (Note that some Centris 650 models have 4MB of base RAM; these are limited to 132MB total.)

Minor Flaws

IN TESTING THE CENTRIS, WE FOUND only a few minor problems.

The most troublesome is Apple's unfortunate decision to optimize the System for each model through the use of enablers—model-specific extensions. If your Centris (or Quadra 800 or LC III) has a system crash or the System Folder is damaged, you won't be able to use the emergency start-up disk provided by Norton Utilities or another recovery program. The new Macs won't run on anything older than System 7.1 (or the System version the new Mac came with). You can restart with Apple's Disk Tools disk, but you can't then eject the disk to run your recovery program. The Disk First Aid program on the Disk Tools disk is OK, but not up to the standards of a dedicated recovery program. You can make your own emergency start-up disk by copying the Disk Tools disk and putting your recovery software on it, but chances are that there's not enough room for both the System and the recovery software.

Picking a Centris

ACCORDING TO MY SURVEY OF DEALER prices, a fully loaded Centris 610 costs about \$3700, which includes a 230MB hard drive, 12MB of RAM, 1MB of video RAM (which gives you 16-bit color on 16-inch or smaller monitors), built-in

Ethernet, an extended keyboard, the new Apple mouse, and a name-brand multi-sync monitor, like an NEC 3FGx or a Sony CPD-1304. (The Apple 14-inch monitor's quality is not as good as these, or even as its 13-inch predecessor. The 14-inch monitor also has a smaller active screen area than the earlier 13-inch model. Go figure.) Add about \$1000 for a similarly equipped Centris 650.

For Macs, these are great deals considering their computational abilities. That's still \$800 to \$1000 more than comparably equipped (and faster) Windows PCs. Apple needs to find other ways to trim costs without trimming quality so it can compete effectively in the business market that it is clearly targeting.

Though the Centris 610 should fill most people's needs, I'm concerned about the 610 as a long-term investment; both coprocessor and NuBus expansion are expensive, and total expansion is limited. But if you don't plan to expand your system much, go for it. How can you tell if you need to expand? Look at the NuBus boards and expansion options you now have, subtract from that number the number of features built into the Centris (like 8-bit or 16-bit video display and Ethernet), and see what's left. If you need more than one NuBus board, don't get a 610.

If your IIci's slots are full and you dream of doing rendering, 24-bit color image editing, or aircraft design, go for a 650 (or better yet, the new Quadra 800). But beware the 650 base model: it lacks Ethernet and a math coprocessor, and has only 4MB of base RAM soldered onto the logic board. The slight savings for the base 650 is not worth the cost of adding Ethernet or a math coprocessor later.

If you just use Microsoft Word and Excel all day long, consider a 68030-based LC III—it's the same speed as a IIci and priced at about \$2400 for a well-outfitted system. Otherwise, look forward to a Centris on your desk.—GALEN GRUMAN

PostScript Laser Printers

LaserWriter Pro series

PROS: Superb output quality of scanned images and text; excellent paper-handling features; reasonably priced; LaserWriter Pro 630 accepts internal and external hard drives and includes Ethernet port. **CONS:** No front-panel mode switches or status display; no resolution enhancement in 600-dpi mode; no emulation-sensing features. **COMPANY:** Apple Computer (408/ 996-1010). **REQUIRES:** Mac Plus; System 6.0.5. **LIST PRICE:** LaserWriter Pro 600 \$2099; LaserWriter Pro 630 \$2529.



THE LASERWRITER PRO 600 AND LaserWriter Pro 630 are the latest members of the distinguished LaserWriter line—the printers that have popularized the PostScript page-description language and helped fuel the electronic-publishing revolution. From their paper handling to their print quality, the LaserWriter Pro 600 and LaserWriter Pro 630 are Apple's best printers yet. Their prices are even reasonable: \$2099 for the LaserWriter Pro 600; and \$2529 for the LaserWriter Pro 630, which has additional connection ports but is otherwise identical to the 600.

The LaserWriter Pro series replaces the LaserWriter II line. What's new? Just about everything, starting with the print mechanism itself. The new printers use Canon's EX print engine, which prints up to 600 dpi, versus the 300-dpi resolution used by the LaserWriter II series and many other laser printers. Like the LaserWriter II printers, the LaserWriter Pros print a maximum of 8 pages per minute.

The EX print engine is Canon's best yet. Character edges are crisp and clean, with none of the toner *scatter* that was

common with older Canon engines. Toner scatter occurred because of stray electrical charges generated by a relatively imprecise corona wire, the component that attracts toner from the photoconductive drum to the paper. In the new EX engine, the corona wire is replaced with a roller that makes physical contact with the drum, eliminating stray charges.

The LaserWriter Pros are easy to set up. Remove some packing materials, open the printer's lid, slide a disposable toner cartridge into place, and close the lid. In earlier Canon engines, the toner cartridge installed in the pop-up lid itself, and you had to use some force to close the lid. Over the years, this hood-slammung could cause the engine's optics to become misaligned, diminishing print quality. In the new EX engine, the cartridge slides into the engine itself, and the lid closes with a light touch, so there's less chance of the printer's optics becoming misaligned after years of use. As with its previous printers, Apple includes with each toner cartridge a prepaid shipping mailer for returning the cartridge for recycling.

Another welcome new feature the EX engine provides is a so-called multipurpose tray—a second, 100-sheet paper tray that is built into the printer. The LaserWriter Pros also include a conventional, slide-in paper cassette that holds 250 sheets. Available paper-handling options include an envelope feeder and a 500-sheet feeder (each retails for \$399).

To take advantage of both trays, the LaserWriter Pros include a new version of the LaserWriter printer driver. The new driver, version 7.2, provides a Print dialog box containing a pop-up menu that lets you select the paper source for a given document. The new driver also lets you choose between 300- and 600-dpi resolution as well as control the printers' PhotoGrade and FinePrint output-enhancement technologies.



The LaserWriter Pro 630 from Apple Computer

In Control

EVERY POSTSCRIPT PRINTER NEEDS A controller, which deciphers the PostScript commands coming from the Mac and translates them into the ones and zeros that the print engine uses to determine where to apply toner. Like the LaserWriter IIg's, the LaserWriter Pros' controllers use 68030 processors running at 25MHz. Both LaserWriter Pro models include Adobe PostScript Level 2 and 8MB of memory, expandable to 32MB. Both printers contain the standard 35 Type 1 PostScript fonts, 29 TrueType fonts supplied on disk, bringing the total number of fonts provided to 64.

The LaserWriter Pros are faster than their predecessors, but the difference is not significant (see "LaserWriter Pro Times"). In many of Macworld Lab's tests, the LaserWriter Pros performed similarly to their closest competitor, Hewlett-Packard's \$2399 LaserJet 4M, which also uses the Canon EX engine. The LaserJet 4M was faster in the Aldus FreeHand test (probably because of its RISC processor), as well as in the PageMaker test in 300-dpi mode, but not in 600-dpi mode.

Like the LaserWriter II and IIg, the LaserWriter Pros include Apple's Photo-
continues



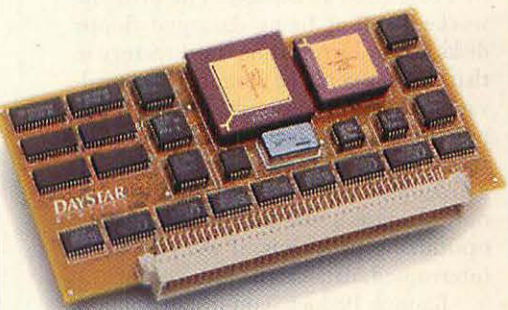
LaserWriter Pro Times

Tests were conducted on a Mac IIci running System 7.1, with a cache card installed, 8MB of RAM, a Quantum Pro 80 internal hard drive, AppleTalk on, and background printing off if possible.

	Multiple Fonts	Courier	MacDraw Pro	Aldus FreeHand 3.1	Aldus PageMaker	TrueType
All times in seconds. Shorter bars are better.	Print speed for a typical multiple-font document. We used a seven-page Microsoft Word 5.0 document containing a variety of fonts, sizes, and styles.	Printer throughput for a two-page Microsoft Word 5.0 document containing double-spaced 12-point Courier text in plain, bold, and italic.	Print speed for complicated drawings without many special effects. We used a graphic containing more than 2000 simple objects and several lines of Helvetica text.	Print speed for complex graphics that include special PostScript effects. We used an illustration that includes nonlinear blends and Bézier curves.	Print speed for a typical high-end desktop publishing job. We used a four-page newsletter containing several fonts, a MacPaint image, and three gray-scale TIFF images.	Print speed for TrueType, using a one-page Microsoft Word document with four fonts. Results are based on the first of three tests. Subsequent tests resulted in faster LaserWriter Pro results.
300 dpi						
Hewlett-Packard LaserJet 4M	161.3	167.3	179.2	391.5	90.6	92.1
Apple LaserWriter Pro 630*	143.9	168.2	180.7	448.6	113.7	90.9
Apple LaserWriter Pro 600*	141.6	168.6	182.9	438.5	118.7	89.1
Apple LaserWriter IIg*	142.3	175.1	177.8	454.3	108.7	96.3
600 dpi						
Hewlett-Packard LaserJet 4M	199.2	167.9	179.2	438.4	152.3	97.1
Apple LaserWriter Pro 630	174.0	169.6	183.4	565.6	147.4	113.4

*In the FreeHand and PageMaker tests performance was slightly slower with PhotoGrade on.

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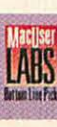
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Grade and FinePrint output-enhancement technologies. (PhotoGrade improves the appearance of scanned images; FinePrint enhances text and line art.) Apple improved the PhotoGrade technology to provide 91 levels of gray, compared with the 67 levels provided by the LaserWriter IIg.

Both PhotoGrade and FinePrint are available only when you've chosen 300-dpi resolution. By contrast, the resolution-enhancement technology provided by the LaserJet 4M works at both 300 and 600 dpi. As a result, the LaserJet 4M produces slightly sharper text—but you may need a loupe to see the difference. As for scanned images, there's no clear-cut winner: in my tests, some images looked better printed at 300 dpi with PhotoGrade, while others looked better printed at 600 dpi.

As for ports, the LaserWriter Pro 600 has LocalTalk, Centronics parallel, and serial connections—the LaserWriter IIg and IIx lacked the Centronics port, which is most commonly used to attach DOS PCs. (Both printers include Microsoft Windows driver disks.) The LaserWriter Pro 630 adds an Ethernet port as well as two SCSI ports to which you can connect a hard drive for storing fonts and boosting performance. One of the 630's SCSI ports is internal, making this the first Apple printer that can use an internal hard drive. (Procom Technology [714/549-9449] is shipping a 2½-inch hard drive for the 630.)

Like the LaserWriter IIg and IIx, the LaserWriter Pros sport an all-ports-active design—you can connect a DOS PC to the parallel port and a Mac to the LocalTalk port, and print from each machine without flicking switches. Unfortunately, the LaserWriter Pros do not support emulation sensing—they don't monitor incoming data and switch between, say, PostScript and HP LaserJet emulation modes. Emulation sensing is becoming commonplace among printers in this class; the absence of it makes the LaserWriter Pros less desirable for mixed-platform offices than printers from firms such as HP, Compaq, and QMS.

I have one more nit to pick: the lack of a front-panel status display and options for adjusting paper sources, resolution, and other settings. Both are common in other printers, but Apple continues to rely on blinking status lights and on the LaserWriter utility, which runs on the Mac.

But these are minor flaws in two otherwise excellent printers. The LaserWriter Pro 600 and 630 aren't just Apple's best printers ever, they're among the best printers available in their price range.—JIM HEID

Disk- and File-Utility Package

Public Utilities for the Macintosh 1.0

PROS: Automatically scans hard drives for problems; can restore files after disk optimization; excellent technical support. **CONS:** Slow disk optimization; Launch Pad utility deals poorly with multiple screens. **COMPANY:** Fifth Generation Systems (504/291-7221).

REQUIRES: Mac Plus; System 6.0.2. **LIST**

PRICE: \$149.



THE FIELD OF DISK- AND FILE-RECOVERY packages is already well represented with Symantec's Norton Utilities for Macintosh and Central Point Software's MacTools 2.0. These packages also include utilities for backup, disk editing, and virus protection. Fifth Generation Systems' (FGS) Public Utilities sticks to the basics of disk diagnosis, disk repair, and file optimization—and does a good, and in some cases a unique, job.

Public Utilities consists of the Public Utilities repair and optimization application; the Prevention control panel; and Launch Pad, a file- and application-launching utility.

The Prevention control panel scans your hard drive, looking for a wide range of problems, including directory damage, bad blocks, and excessive fragmentation. If Prevention finds a problem, a dialog box asks if you want to fix it. The Prevention scan can be at start-up, shutdown, or while your Mac is idle. Prevention also creates invisible files that assist in restoring files that have been thrown away. When I added a new hard drive to my system, Prevention automatically began scanning the new drive for problems.

The Public Utilities application window has five buttons that access the main features of the program. Repair Disk scans for directory damage and problems such as bad file dates, and fixes them if found. Repair File is misnamed, as it doesn't fix damaged files; it recovers any data that it can from a damaged file that contains text, lets you view the result, and filters out any nonprinting characters. Undelete File uses the Prevention deletion record or scans the drive to restore deleted files. Optimize Disk defragments files and consolidates free space, thus making file access faster. Although Public Utilities' optimizing works well, it takes considerably more time than Norton's Speed Disk program. The last button launches the Prevention window.

The program's disk-repair features are very good, although like all disk-repair programs, Public Utilities repairs some problems that other programs cannot, and vice versa. In my tests, Public Utilities fixed most hard drives with damaged directories, and did a good job restoring files, especially files that had been tracked by Prevention as deleted. The program worked well at fixing damaged floppy disks, either by repairing the directory so that the disk could be mounted, or by salvaging the text of seriously damaged floppies. One unique feature of Public Utilities is the ability to restore files even after a disk optimization. Another plus is that optimizing is a safe process; with other optimizing programs, if the process is interrupted, data can be lost.

Launch Pad lets you install application icons into its floating icon palette and launch files by double-clicking on installed icons. You can attach documents to a program icon and access that document via a \mathbb{H} -key combination. But Launch Pad doesn't work well with multiple screens that are set at different bit depths. It assumes the bit depth of the main monitor, and uses a window and icon view appropriate to that monitor's setting. Problems occur if you move the Launch Pad window to a screen with a different bit-depth setting. For example, if your main screen is set at 8-bit color, and you move the Launch Pad window to a black-and-white screen, the window doesn't change to the black-and-white configuration; the window becomes all black and the icon buttons are invisible.

Fifth Generation's technical support is a true cut above—way above—the rest. First of all, the tech-support number is toll-free. Someone is available 24 hours a day, 7 days a week, except for major U.S. holidays. And best of all, the tech-support representatives know their stuff. FGS also maintains support forums on CompuServe and America Online, as well as offering a money-back satisfaction guarantee. If you need a replacement disk, or an upgrade to a current product, FGS sends it via overnight courier. Another great policy: if you own four FGS products, the fifth product is free.

Public Utilities doesn't have the bells and whistles of its competition, but its tight focus on disk repair and optimization, along with great tech support, deliver solid value. Prevention's proactive approach to disk diagnosis makes Public Utilities a good choice for anyone who wants a protection program. Considering that I bought a computer to get my work done more efficiently, it's good to find a program that lets my Mac keep an eye on itself.—TOM NEGRINO

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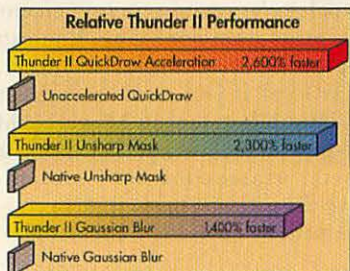
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Color-Image Editor

Adobe Photoshop 2.5

PROS: Variations feature; simplified mask editing; previews for Distortion filters; improved brush- and path-editing capabilities; faster redraw. **CONS:** Magic wand needs work; lacks image previews; no HSB and HSL edit modes; rubber-stamp tool and pressure-sensitivity altered for the worse. **COMPANY:** Adobe Systems (415/961-4400). **REQUIRES:** Mac II; 4MB of RAM; hard drive; System 6.0.7. Recommended: 8MB of RAM; 24-bit video board; color monitor; System 7. **LIST PRICE:** \$895.



SINCE ITS ARRIVAL ON THE SCENE, Photoshop has been the darling of the Macintosh design community. No graphics program is so universally loved and so downright deserving of user loyalty. Version 2.5—Photoshop's first upgrade in a year and a half—builds on its predecessor's wide range of capabilities; it also ignores some minor weaknesses that have begun to peek through the chinks in the great program's armor. And in a move I can only describe as bizarre, Adobe has slightly changed a variety of features in ways that will mystify devotees of Photoshop 2.0 while providing no measurable benefit to new users.

Helping Hands

PHOTOSHOP 2.5 INTRODUCES THREE enhancements. First, the Variations command lets you test color corrections by selecting from a series of thumbnails. You can move the selected area toward blue, magenta, or another primary color. You can also change the lightness of an image in incremental steps. Unlike Assist Mode in Caere's Image Assistant, Variations doesn't let you adjust focus or apply special effects, but it does offer greater control over color correction by allowing you



Masking with Brushstrokes Quick Mask mode enables you to change the selection boundary using paint tools. When I exit Quick Mask mode, all gray portions of the image will become selected. I can then paint exclusively inside the selection boundary or apply color or filter effects.

to selectively adjust shadows, highlights, and midtones.

The second image helper is Quick Mask mode, which simplifies image-masking by letting you edit selection outlines with painting tools. Actually, you've always been able to do this by saving the selection to an independent color channel, but many artists shy away from channel operations because of their perceived complexity. The Quick Mask function eliminates this barrier by creating temporary channels on the fly. A translucent layer of color shows the areas that are not selected, and therefore masked. You paint with black to subtract from the selection, and paint with white to add to it.

The third assist feature is entirely undocumented but is worth mentioning. After you implement a little trick—pressing the option key while choosing the Displace filter from the About Plug-Ins submenu—Photoshop adds slider bars, grids, and image previews to many of its Distortion filters. Suddenly, you can predict the outcome of these filters.

Many of Photoshop 2.5's most powerful features are relegated to floating palettes, which provide greater convenience but also take up screen space. In addition to enhancing the Info and Color palettes, version 2.5 sections off channel operations and expands brush shapes and paths. Brush size is no longer limited to a 19-pixel circle. You can edit the size and hardness of a brush shape, make it elliptical instead of round, rotate it to a specified angle, and save and load customized brushes. With the Brushes palette, Photoshop 2.5 exceeds just about every other paint program except Fractal Design Painter in creating free-form images.

Photoshop's expanded Bézier-based path tool is both powerful and less convenient. You can now convert points in an existing path, create open and closed paths, and force brushstrokes to follow the course of a path (to blur around the edges of an image, for example). But the Paths palette's greatest improvement doubles as its most confusing. You can save paths for reuse within an image, which is ideal if you need to reselect details. But while in version 2.0 you could simply draw an outline and click inside it to convert it to a selection, in 2.5 you must first save the path and name it, then convert the path by choosing a command.

Sophomore Slump

PHOTOSHOP IS NOT WITHOUT ITS weak points. The magic-wand tool, for example, is the same old tired feature Photoshop introduced nearly five years ago. Similar tools in Painter and Time-works' ColorIt easily outpace it. In

Painter 2.0, for example, you can dynamically change the range after you click in an image to adjust the boundary of the selection. You can also limit the range in terms of hue, saturation, and brightness, which means that you can select only the blues in a sky, the deep tones in a face, or the bright colors that exceed the CMYK print values. In Photoshop, it's still a click here and a shift-click there.

Some convenience tools remain untapped. Photoshop has yet to introduce image previews in the open dialog box, a feature that is almost universally accepted among other paint programs. You can save icon previews, but those are far too small to be of any use. And while version 2.5 lets you assign your own keyboard equivalents to commands, it arbitrarily limits you to function keys, which most experienced users have long ago assigned to other purposes.

While version 2.5 retains the HSB (hue, saturation, brightness) metaphor in its color editor, you can no longer edit images in the HSB or HSL color modes. Adobe's logic is that its new Lab color mode fills this void, but in fact it does not. The *L* in *Lab* stands for "luminosity," just as in *HSL* the *L* stands for "lightness"; but *a* and *b* each represent color-opposite axes. Lab provides no equivalent for saturation, which means you can't downplay or highlight selective portions of an image as effectively as you could in version 2.0.

The rubber-stamp tool and pressure-sensitive input are damaged compared with previous incarnations. Now any changes you make affect the tool as you use it. If you aren't careful, you end up cloning and re-cloning areas, which results in obvious patterns that betray retouching. You can now specify that changes in stylus pressure affect the size, color, and/or opacity of the cursor. However, whereas you can easily create strokes that taper to a fine point in Photoshop 2.0, version 2.5 rounds off the edges prematurely and makes light strokes translucent, even if the opacity option is not active.

Taken as a whole, it's unlikely that these minor problems will squelch your enthusiasm for the program. Indeed, there are gobs of enhancements. Version 2.5 redraws the screen image more quickly, it lets you paint and select without waiting for the screen to refresh, it retains selections after you change color modes, it performs any operation in the background under System 7 except launching, and it remembers preference settings and palette positions between sessions—just to name a few. But considering the reputation of previous versions of Photoshop, it may come as a shock that 2.5 is anything but perfect.—DEKE MCCLELLAND

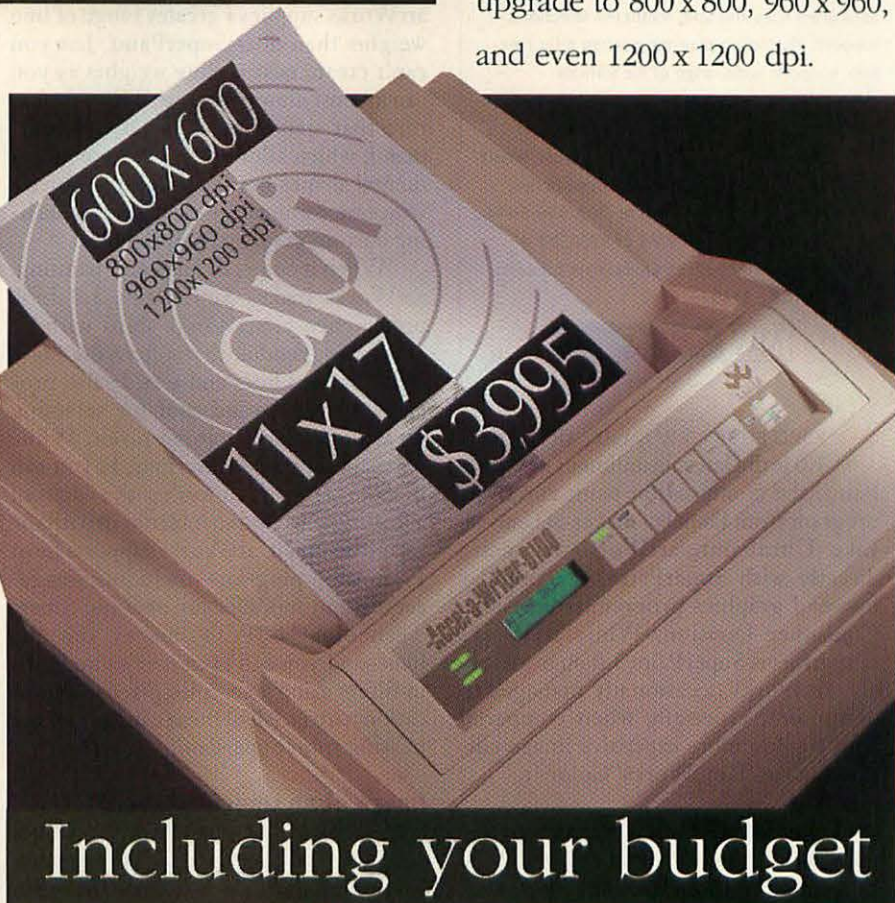
Certain things should not be compromised

When the printed page is a reflection of your creativity, don't let the printer compromise your work. Xante's Accel-a-Writer 8100 will ensure the printed page is as good as the person behind it.

The Accel-a-Writer 8100 is an 11" x 17", 600 x 600 dpi laser printer that provides full PostScript® compatibility and a level of performance that will improve the quantity of your work as well as the quality.



Supporting 11" x 17" paper is only one of the paper handling benefits. The Accel-a-Writer 8100 comes with two input trays, allowing you to print on dif-





ferent size pages without having to reload the printer. A third tray can be installed to allow for up to 850 sheet capacity.



Xante combines resolution technology and ultra-fine toner

to break the 600 dpi barrier and provide unmatched quality. With the Accel-a-Writer 8100, you can upgrade to 800 x 800, 960 x 960, and even 1200 x 1200 dpi.

	Accel-a-Writer™ 8100	QMS® 860 Print System	NewGen® TurboPS 660 B	CalComp® CCL-600
Standard Resolution (dpi)	600 x 600	600 x 600	600 x 600	600 x 600
Optional Resolution (dpi)	800 x 800, 960 x 960 & 1200 x 1200	None	600 x 1200	None
Standard RAM	12 MB	12 MB	12 MB	4 MB
Virtual Disk Technology	 †			
Enhanced Gray Scale				
Price	\$3,995	\$4,595	\$5,495	\$3,995

† Optional

Statistics as of 2/93

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You may be surprised to find you won't be forced to compromise your budget either. At \$3,995, it is the most aggressively priced printer in its class.

Don't compromise your work. Call Xante directly to order your Accel-a-Writer 8100.

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Circle 2 on reader service card

24-Bit Paint and Draw Program

artWorks 1.0

PROS: Multiple bitmapped and object-oriented layers; blends between multiple objects; antialiased lines and text; feathered selections; supports Photoshop plug-ins; custom filter creation; supports wide range of file formats.

CONS: Badly implemented Bézier-curve tool; only two colors per gradient; doesn't support QuickTime JPEG; poor image-editing tools; Smart Memory function impedes Finder operations.

COMPANY: Deneba Software (305/596-5644).

REQUIRES: Mac Plus; 2MB of RAM; hard drive; System 6.0.5; 32-bit QuickDraw for color.

LIST PRICE: \$149.



DESPITE ITS NEW NAME, ARTWORKS 1.0 is the latest installment of UltraPaint, the combination paint and draw program from Deneba, maker of Canvas. Like UltraPaint, artWorks competes directly with SuperPaint, the popular low-end graphics program from Aldus Consumer Division. While artWorks outperforms SuperPaint 3.0 on most levels, artWorks occasionally manages to disappoint, especially when compared with slightly more expensive image editors such as TimeWorks' Color It.

Plugging SuperPaint's Holes

LIKE CANVAS, ARTWORKS ALLOWS YOU to create multiple bitmapped images inside a single document. You can even assign images to layers and position them in front or in back of object-oriented shapes and text. artWorks' transfer-mode functions let you mix the colors of bitmaps and objects, but transfer modes are incompatible with PostScript printers. Transfer modes aside, artWorks' multiple-layer scenario provides a degree of artistic freedom that is unmatched by SuperPaint, which limits you to two layers—one for images and one for objects—both of which are fixed.

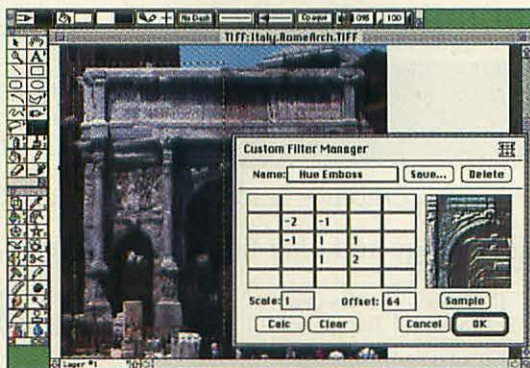
In terms of drawing, artWorks rates only slightly better than SuperPaint. Both programs provide automatic tracing options for converting jagged bitmaps to smooth object-oriented lines and shapes. Unlike SuperPaint, artWorks provides a point-by-point Bézier-curve tool for creating precise, free-form objects. Unfortunately, the

tool is implemented as badly as in Canvas, and is not as accurate as its equivalent in Adobe Illustrator or MacDraw Pro. It's extremely hard to draw a shape correctly the first time out; you inevitably have to go back and reshape the curve. artWorks supplies a greater range of line weights than does SuperPaint, but you can't create custom line weights as you can in most draw programs. The only feature that stands out is the Blend command, which allows you to create incremental shapes between multiple objects with one command—ideal for establishing custom gradients and the like.

When it comes to full-color painting, artWorks makes SuperPaint 3.0 look pretty cheesy. artWorks ships with an antialiasing module that softens the edges of bitmapped lines and text. It also provides a magic-wand tool for selecting areas of similarly colored pixels. While you can't antialias selections, as you can in Color It, you can feather the edges of a floating selection so it blends in with the image behind it. artWorks supports most Photoshop plug-ins—including image-acquisition modules for opening Storm Technology's JPEG images and the like—and you can even edit some built-in filters using a complex pixel-multiplication matrix. All of these capabilities are missing from SuperPaint.

Image of an Underachiever

WITH SPECIFIC RESPECT TO SUPERPAINT, artWorks' only misfire is its gradient editor, which permits only two colors per gradation. By contrast, SuperPaint allows up to 256. Still, artWorks has its share of problems. It's very slow to open large 24-bit images. And artWorks provides no built-in support for PICT images subject to QuickTime JPEG compression.



Filter by the Numbers Never one to shy away from ridiculously complex features, artWorks lets you edit many of its filters by entering numbers into a matrix. It's a valuable feature, the kind of thing you expect to see only in high-end image editors like Adobe Photoshop, but you need algebraic reasoning skills to get to first base with it. artWorks would be a better program for the entry-level user if it concentrated more on its low-end image-editing capabilities.

Regardless of file format, artWorks isn't smart enough to size a document in keeping with the opened image. Every new image lands on a letter-size page. Meanwhile, artWorks doesn't let you scroll off the page, so if you want to view, say, a horizontal image, you have to change the page size, a leap of logic that few uninitiated users are likely to make.

The image-editing tools perform significantly below what I expected. Even at their highest settings, the smudge and blur tools provide uniform results only if you drag *extremely* slowly. Otherwise, the tools perform sporadically, delivering discontinuous blobs of smeared color that do more to spoil an image than to fix it. It's also worth noting that the fill tool fails to take transitional edges into account, so if you try to fill an antialiased outline, artWorks creates a jagged halo around the interior color.

artWorks is the first Deneba program to include Smart Memory, a function that purports to dynamically adjust the amount of RAM occupied by the application. Under System 7 (or System 6 with MultiFinder), you don't have to change the amount of memory assigned to artWorks using the Get Info command. Instead, artWorks merely usurps portions of the available RAM whenever you open large documents or perform memory-intensive operations. Under System 7.1, however, I found that artWorks didn't communicate as effectively with the system software. Frequently, I couldn't perform simple operations at the Finder level—opening folders, copying files, accessing control panels—because artWorks had gobbled up memory that the system thought it was using. Smart Memory is a nice idea, but unless it works 100 percent seamlessly with other open applications—including the Finder—this is one feature that can be downright dangerous to the stability of your Mac.

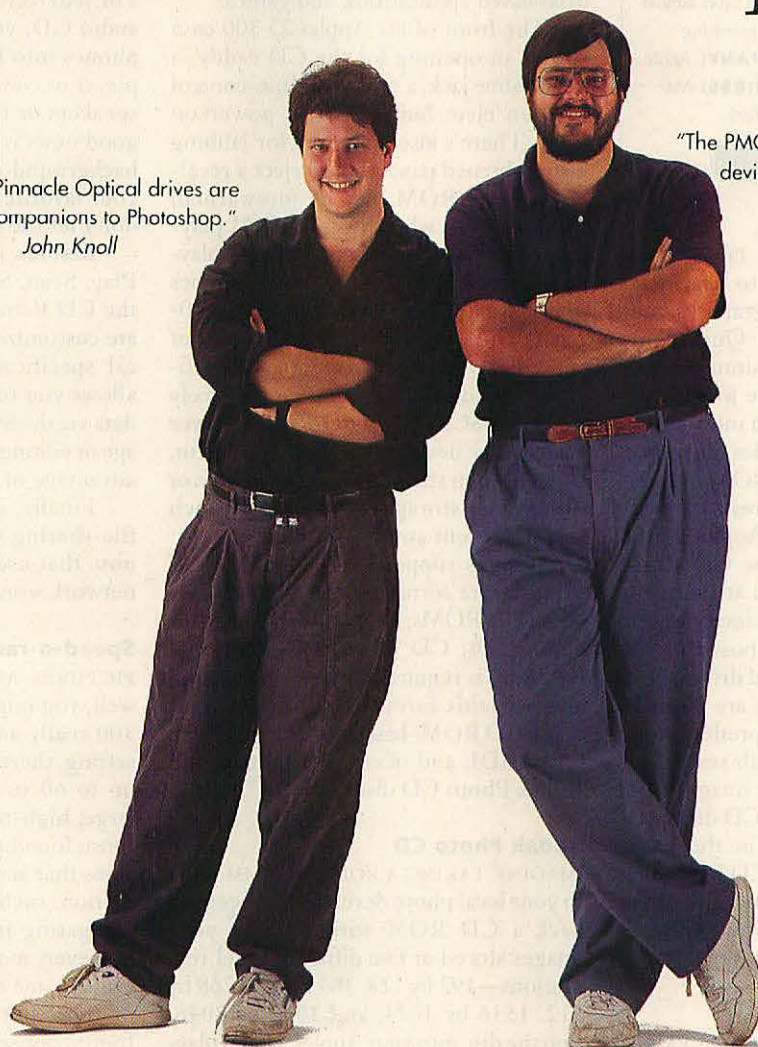
If you were expecting another graphics dynamo like Canvas, artWorks will leave you a little cold. Its draw capabilities don't approach those of Canvas, and many of its paint tools lack clear purpose and implementation. Still, like Canvas, artWorks comes equipped with a wide range of import and export filters; you can open and save PICT, TIFF, EPS, GIF, MacPaint, and Adobe Illustrator files and even create start-up-screen documents.

artWorks is nothing if not a mixed bag. Despite its lack of pizzazz and its occasional flaws, the program provides enough low-end and midrange capabilities to make it one of the best graphics programs under \$200. And let's face it, artWorks is by any account a better value than SuperPaint.—DEKE MCCLELLAND

First the Knoll Brothers created Adobe Photoshop™...

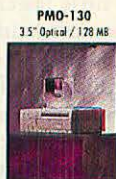
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John Knoll

"The PMO-650 is the ideal storage
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Circle 238 on reader service card

Dual-Speed CD ROM Player

AppleCD 300

PROS: Faster access for large files; multisession Kodak Photo CD—ready; plays audio CDs; easy setup. **CONS:** Many CD ROM tasks almost as slow as ever; no audio for those accessing a CD ROM over a network. **COMPANY:** Apple Computer (408/996-1010). **REQUIRES:** Mac SE; System 6.0.7. **LIST PRICE:** \$599.



CD ROM TECHNOLOGY PROMISES A lot—interactive access to large databases of information and graphics, animations, video clips, and QuickTime movies, all backed with simultaneous sound. The hitch lies in the word *access*. Waiting many seconds for a motion segment, or for a sizable graphics file to load into memory, many a CD ROM user has lost both patience and interest.

But there is hope. The AppleCD 300 belongs to a batch of new CD ROM drives that spin their discs at twice the previous speed—a linear velocity of 300 kilobytes per second as opposed to 150 KBps. Still slower than hard drives, double-speed CD ROM drives are 20 to 70 percent faster than their predecessors, according to Macworld Lab tests. Plus you can now view and edit images from multisession Kodak Photo CD discs; you can listen to audio CDs in the background; and you can share CD ROM files over a network. (Expect noticeable slowdowns when more than one person is accessing a CD ROM, however.)

Plug and Play

SETTING UP AN APPLECD 300 IS FAIRLY simple. Simple, that is, if you remembered to purchase separately the cable that connects to your Mac, a cable terminator, and a peripheral interface cable if you plan to chain your CD ROM player with other SCSI devices. The drive comes with a CD caddy, power cord, easy-to-follow documentation, and two floppy disks. One disk contains installation files, a CD Remote DA (an on-screen mock-up of a remote-control device that controls audio-only play), and a SpeedSwitch control panel device for switching between the 150KB transfer rate for audio CDs and the 300KB rate for CD ROMs; the other disk has QuickTime 1.5, SlideShow Viewer, and Apple Photo Access extensions, all necessary for viewing Photo CD images. The drive also comes with a bundle of CD ROMs, which at press time included *From Alice to Ocean* (Against All Odds Productions); *Cinderella* (Discis Knowl-

edge Research); *Mozart: The "Dissonant" Quartet* (Voyager); a Kodak Photo CD Sampler; an introductory disc of the CD ROM magazine *Nautilus*; plus three Apple discs that include listings and demos of Mac-based CD ROMs, floppy disk-based applications, and games.

The front of the AppleCD 300 case sports an opening for the CD caddy, a headphone jack, a rotary volume-control dial, an eject button, and a power-on light. There's also a pinhole for jabbing a straightened paper clip to eject a recalcitrant CD ROM, but be forewarned: Never try this when the CD ROM player is turned on; severe damage to the player could result. Connectors and switches on the back of the player include two 50-pin SCSI ports, two RCA audio-output jacks that connect to an external amplifier or amplified stereo speakers, a nicely designed SCSI ID switch, and a power switch. The design is simple and efficient, though when stacked with a hard drive or other mass-storage device, the 13-inch length juts out awkwardly.

Besides supporting the ISO 9660/High Sierra format used by most Mac-based CD ROMs, the AppleCD 300 reads audio CDs; CD ROM XA (additional hardware is required to read compressed audio in this format); CD+G (used by many CD ROM-based karaoke systems); CD+MIDI; and of course, multisession Kodak Photo CD discs.

Kodak Photo CD

IMAGINE TAKING A ROLL OF 35MM FILM to your local photo developer and getting back a CD ROM with each of your images stored at five different pixel resolutions—192 by 128, 384 by 256, 768 by 512, 1536 by 1024, and 3072 by 2048. Pop the disc into your AppleCD 300 player, choose the resolution you'd like to view, and voilà, thumbnail miniatures of each image appear as icons.

The images are preset to open in Picture Compressor, a utility not included in the CD ROM box (it is in Apple's QuickTime Startup Kit). In Slide Show Viewer, you can set preferences so that double-clicking on the icon opens the image in TeachText or the application of your choice. You can then edit the photo and incorporate it into documents as you would any other scanned file.

If you would simply like to scan through the photos, open the Slide Show Viewer utility, choose one of the two image sizes, and sit back. This won't work if you are running a 68000 Mac, however; QuickTime doesn't run on 68000 CPUs, so there is no slide-show option.

Best of all, the AppleCD 300 drive is the first to read multisession discs, which

means that you can have subsequent rolls of film—up to 100 images—recorded on the same Photo CD disc. Older drives can't read these discs.

Audio Notes

THE BAD NEWS IS THAT TO LISTEN TO AN audio CD, you must either plug headphones into the front of the CD ROM player or connect the player to amplified speakers or to your stereo system. The good news is that the music plays in the background and you can still listen to your favorite tunes while you work. Just don't let the boss catch you whistling.

Besides including the usual Stop, Play, Scan, Shuffle, and Pause buttons, the CD Remote DA lets you easily create customized playlists. Apple's technical specifications note that the drive allows you to transfer CD digital audio data via the SCSI bus to the Mac for storage or editing, but no applications yet take advantage of this feature.

Finally, if you are using System 7's file-sharing with the CD ROM player, note that users accessing discs over the network won't hear the audio portions.

Speed-o-rama

PICTURES AND SOUND ARE ALL VERY well, you might say, but is the AppleCD 300 really any faster? At the 300 KBps setting, there are speed improvements of up to 60 to 75 percent when opening large, high-resolution color files such as those found on Photo CD discs. Operations that access smaller blocks of information, such as searching a database or navigating from one scene to another, however, may not be noticeably faster. QuickTime movies run the same length of time, but you'll probably see more frames per second at 300KB—unless the CD ROM has been optimized for 150 KBps display, in which case you will see no enhancement at all. And don't forget, the faster the main processor in your Mac, the faster you'll see refreshed pixels on your screen.

Is the AppleCD 300 worth it? I think so; I'm buying one. Its list price is only \$50 more than the old AppleCD 150, the software utilities are well designed, overall performance is at least a little faster, and I'm looking forward to working with multisession Kodak Photo CD files. I don't mind the idea of donning headphones to listen to a little grunge rock or Gregorian chant while I work, and I like knowing that I can share files in a network setting. Thinking ahead, I look forward to QuickTime applications that will take advantage of the enhanced transfer rate to show faster frame rates in larger windows.—SUZANNE STEFANAC

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Integrated Software

WordPerfect Works 1.2

PROS: Modules well integrated; includes very good word processor; provides in-context editing. **CONS:** Needs more RAM than other current integrated packages; creating new frames is slow; weak database module; poor memory management.

COMPANY: WordPerfect Corporation (801/225-5000). **REQUIRES:** Mac Plus; hard drive; System 6.0.5. **LIST PRICE:** \$249.



YOU THOUGHT YOU'D HEARD THE last of integrated software programs? Well, think again. WordPerfect Works (WPW) is a revised version of BeagleWorks, an innovative but buggy integrated program that Beagle Bros first released in the spring of 1992. WordPerfect claims that in addition to renaming the program and updating the documentation, it has squashed "a few hundred" bugs. WPW is indeed a substantial improvement over BeagleWorks 1.1 in the bug department and is ready for prime time, although some problems remain.

WPW consists of seven modules: word processor, database, spreadsheet, chart, draw, paint, and communications. It uses System 7's publish and subscribe to integrate the modules; however, under System 6, it can also publish and subscribe its own documents. This method is different from that of other integrated programs in that WPW actually creates a new, separate document, or edition, and links it to the document that you are working in. For example, to add a drawing to a report created in the word processor, you use WPW's frame tool to draw a box in the word processing document. The program prompts you for the type of frame you want (draw, paint, spreadsheet, or chart), and then a window appears within the word processing document. Clicking in the draw frame allows in-context editing, which means you can modify the draw document from within the word processing document.

Common to all WPW modules is the floating tool bar, whose tools and menus change depending on the module you're working in. An advantage to the publish-and-subscribe approach is that several documents can be linked to one edition; changes to the edition automatically update all of the documents. A disadvantage is that all this opening and linking takes a while to accomplish. The delay isn't maddening—about 10 or 15 seconds,

depending on the Mac—but it is enough to interrupt the flow of your work.

Most people write more than they do any other activity, so it's important that the word processing module in an integrated program be robust. WPW's word processor outshines the equivalents in ClarisWorks, Symantec's GreatWorks, and Microsoft Works. In addition to the usual features, WPW adds horizontal and vertical rulers, definable character and paragraph styles, up to 16 columns (snaking or autobalancing), and the ability to display invisible characters. Text automatically wraps around graphics, even irregular graphics. Other features include mail merge, a spelling checker, and a thesaurus. Another feature is the document section, which allows you to have, for example, a two-column sidebar that runs for several pages within a single three-column document and has its own page numbering.

The spreadsheet and chart modules include the basics, with some flourishes unusual to this class of software. There's a nice automatic sum tool, and you can edit cells in the tool bar or within the cell itself. You can attach short notes to any cell, and you can apply a variety of borders or shades to cells.

The WPW database is a flat-file manager that supports a list view and any number of form layouts. Picture fields support graphics from the draw or paint modules or from the Scrapbook. Memo fields are multiple-line text fields, unfortunately limited to 1024 characters. The database module shares its set of calculation functions with the spreadsheet module. The database's performance wasn't very impressive; it took a long time to import a 1000-record test file, and imported the file incorrectly, splitting some records into several different records. The Sort dialog box is confusing and badly done. The database is adequate for what most people will use it for—storing mailing lists for mail merge and printing

mailing labels—but it needs work for anyone who wants to go beyond the basics.

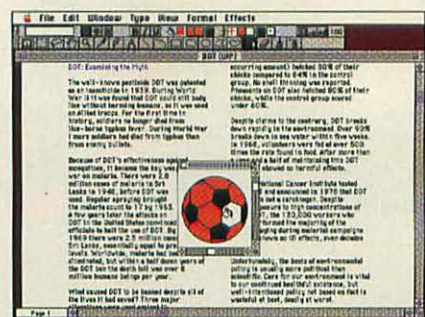
WordPerfect Works' draw and paint modules have the standard tools, but also offer more features than the tools the other integrated programs offer. The draw module's eyedropper tool lets you copy the attributes (such as fill patterns and colors) from a selected object to any other object. You can also scale objects and set all their attributes from a single dialog box. The paint module supports 8-bit color, although this requires that you increase the RAM allocation of the program to at least 1700K.

The communications module is based on Apple's Communications Toolbox and is serviceable but hardly flashy or full-featured. It has an integrated address book to store frequently called numbers, and a simple macro feature to automate logging on to a BBS or an online service.

When working with the program, it's hard to shake the nagging feeling that the programmers could have thought out—and smoothed out—the interface a bit better. In the database module, the Select Records dialog box is ugly and inelegant. In the word processor, you have direct access to headers and footers, and you click on icons in the tool bar to insert the date, time, or page number. Not so in the spreadsheet module, where you have to use codes like &d for the date or &p for a page number. There's a keyboard equivalent to run a spelling checker on a selection, but not one to check a whole document. While these interface problems, and some others, are hardly debilitating, they are annoying in a program that is so slick in other areas.

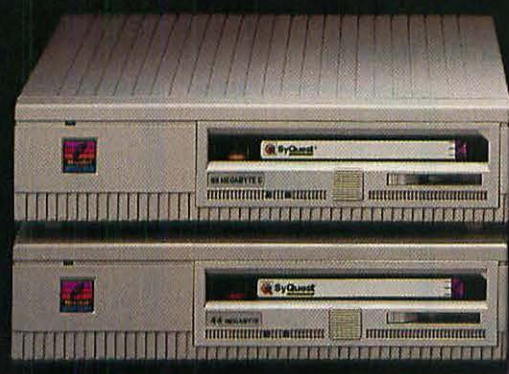
WPW's memory management needs to be fixed. It's easy to overtax the program by simultaneously opening and working with several document windows. After I opened seven windows, and did things like copying and pasting text and linking frames, WPW presented an alert dialog box saying that memory was low and some documents needed to be closed. However, when I clicked on OK, the Mac would often, but not always, freeze. Allocating more RAM to the program increased the number of windows that I could open, but did not solve the problem. With only a few windows open, the program works fine, but WPW needs to deal with memory shortages.

Even with these shortcomings, WordPerfect Works is worth your attention. It's certainly worth the inexpensive upgrade for BeagleWorks owners, and new buyers of integrated software should be pleased with the full-featured word processor and flexible module integration.—TOM NEGRINO



Picture Window The tool palette has changed to a paint palette while I add color to the paint graphic. Clicking on the text returns the palette to the word processing module and the text will wrap around the globe.

Data Exchange...



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DOS-based laptop and desktop computers can now use MicroNet's optional Parallel-to-SCSI adapter which allows you to connect SyQuest removable drives, and other SCSI devices such as a CD-ROM, tape backup system, or a fixed hard disk drive to the parallel port.

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Circle 139 on reader service card





MiniCad+4

MiniCad+4: An unsurpassed mix of ease of use and powerful features defines MiniCad+4. The award-winning MiniCad+ combines 2D CAD, true 3D CAD, a database/spreadsheet, programming language, intelligent interface and AutoCAD translator into one program. New features include 3D walkthrough and flyover tools, tolerancing, automatic roof, wall, and floor tools, and more. CAD0030 \$595

Blueprint 4*

Blueprint 4 makes drafting and design easy for architects, engineers and illustrators. The new version 4 incorporates all the professional 2D features found in MiniCad+4. The price/performance ratio is absolutely unbeatable. Try it on Manufacturer's 30 day money-back guarantee!

CAD0024 \$219*
Publisher: GraphSoft

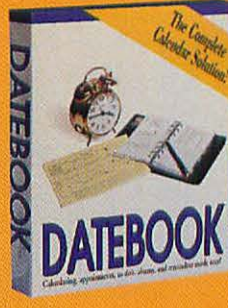
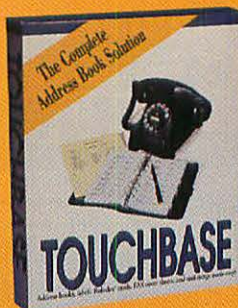
\$219*

TouchBase Pro/DateBook Pro Bundle

NEW! ALL NEW! The award winners just got better. TOUCHBASE and DATEBOOK have turned PRO! Now, a contact manager that provides power and ease of use, and a time manager that has the flexibility to track all your daily activities. With TOUCHBASE PRO, you can manage your contacts, dial your telephone, write letters, and print address books, labels, envelopes and fax covers. DATEBOOK PRO combines calendars, appointments, To Dos, alarms and reminders to keep you on time. Best of all, TOUCHBASE PRO and DATEBOOK PRO are completely integrated. Together they form the BEST in personal information management.

Publisher:
After Hours
Software
BUS0299

\$89



ALERT!

MAXA's ALERT! is essential Desktop Diagnostic™ software that lets you find the source of software conflicts and fix them! ALERT! helps users find the cause of system crashes and frozen screens before they happen. ALERT! diagnoses software on your Mac and reports actual and potential conflicts and

problems. The program also consults a database of known conflicts to further isolate possible problems. With Alert's responder module, consultants, corporate MIS managers and end-users can diagnose and repair software conflicts over a network.

Publisher: Maxa
UTI0353

\$119

Bridge 7.0

Bridge 7.0 pits you and your computer partner against two computer opponents on your Mac. Improved color graphics and screen layouts, plus enhanced bidding and play, make it more fun. Your computer opponents have their own personalities, and digitized speech. Bridge 7.0 recognizes the stayman and blackwood conventions and allows you to adjust the style from conservative to aggressive.

Publisher: Artworx ENT0461
Also available:
Grail Quest-A graphic adventure.
ENT0262 \$19
KaleidoKubes-
A mind-bending game. ENT0417 \$12



\$35

Fractal Design Painter 2.0



Painter, the award winning 24-bit color, Natural-media™ painting program, now includes photo design features. New Painter 2.0 features include image retouching, color separations, tear-off tools, visual previews, additional natural-media tools like marbling, glass distortion and liquid effects, snap-to and adjustable grid paper, Type 1 and

TrueType™ font support, and straight line tools. Perfect for designers, line artists, graphic artists, and students.

Publisher: Fractal Design

GRA0412

Also available:

Fractal Design

Sketcher 1.0 GRA0393 \$99

\$279

Dynodex 3.0

Enter, find and edit your address book information effortlessly! Dynodex will dial the phone, import and export effortlessly, and allow you to write a memo without going to a word processor. You can also synchronize files. Easily print labels, envelopes, Rolodex® cards, and pages to any size personal organizer. Publisher: Portfolio Software BUS0277 Also available:



Dynodex Paper-
Premium grade
organizer size paper.
ACC0428 \$14

\$55

NEW!



Norton Essentials for PowerBook

Norton Essentials will Double the Battery-life of your PowerBook! Norton Essentials for PowerBook is a collection of 10 of the most advanced and comprehensive PowerBook utilities ever.

Publisher: Symantec
UTI0341



\$89

Personal RecordKeeper 3.0



a winner." (MacUser 6/91) BUS0254 \$29

WillMaker 4.0*

Bestselling WillMaker makes it easy to write and update your will, create a children's trust, and save on lawyer's fees! WillMaker was the first self-help legal package developed. Computer Shopper says "...no question it's the best."

Publisher: Nolo Press
BUS0132 \$35*

\$35*



Infini-D 2.0

Winner of the 1992 MacUser Eddy for Best 3D Package! Infini-D 2.0 combines a friendly interface with 3D power: instant conversion of EPS files into 3D objects, awesome animation capabilities, and QuickTime support. Infini-D is the 3D package of choice for graphics and multimedia professionals.



unlimited number of BackBurner Engines and watch the magic of parallel processing burn up your rendering time! Includes a FREE Engine!
Publisher: Specular International
GRA0436 \$369*

BackBurner*

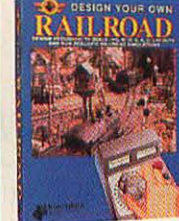
BackBurner is the distributed network renderer for Infini-D. Run BackBurner alone, or add an

\$369*

Design Your Own Railroad

Design Your Own Railroad enables you to design, build, and operate a model railroad on your Mac. Lay out the track using precision CAD tools. Draw scenery with a complete set of color drawing tools. Operation includes coupling and uncoupling, switching, pickup and delivery of loads with revenue tracking, and, of course, crashing! It's an indispensable tool for serious modelers, and fun for rail fans of all ages.

Hard drive and 1 MB memory required.
Publisher: Abracadabra
GRA0398



\$45

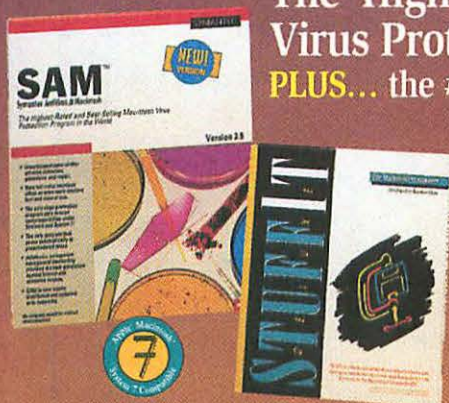
The Highest-Rated and Best Selling Macintosh Virus Protection Program in the World!

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BOTH ONLY

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Publisher: Symantec & Aladdin
BND0180

Suggested Retail Value: \$219

MacWAREHOUSE price: **\$69**

SAM 3.5: The easiest and most complete virus protection ever!

Symantec Antivirus for Macintosh (SAM™) is the most comprehensive antivirus program you can buy. It combats all known viruses and virus clones, and detects file irregularities that could be unknown viruses at work. SAM gives you double protection with its two components: *SAM Intercept*, an Init that protects against viruses by checking every floppy disk as you load it, and *SAM Virus Clinic*, an application that lets you scan files, folders, volumes or network servers for viruses and file irregularities.

StuffIt Deluxe: The most popular data compression program for Macintosh.

StuffIt Deluxe 3.0 invisibly compresses your files and folders an average of 50%. And, it stuffs archive files tighter than any other archiving software. It doubles your disk space, saves you time and money when sending files over network and modem lines, and helps you to backup infrequently used files. Best of all, with StuffIt Deluxe you can continue to use compressed or archived files normally — with no added steps necessary!

BE A POWER USER...FREE!

POWER USER'S TOOL KIT 15.0

The ALL NEW Power User's Tool Kit 15.0 is FREE from MacWAREHOUSE when you order from us. If you want the disk, ask for product code number AAA0039. You only pay \$2.00 postage and handling charges. The programs are shareware, so you can try them free of charge. If you wish to continue using them, some authors ask that you pay a small fee (\$4-\$25). All the details are explained on the disk, which is yours to keep.



FileGuard 2.7

“It's about as much software-based security as you can get in one package.” *MacUser*, March 1992. Protect your hard drive from copying, erasure and unauthorized access (including security bypass with a System diskette). Protect applications, files, and folders (including System folder) from unauthorized access, deletion, and illegal copying. Deny desktop alterations by unauthorized users. Keep an eye on system usage with FileGuard's User Log which continuously tracks user or group activity. System 7.0 Compatible.

Publisher: ASD Software
UTI0135

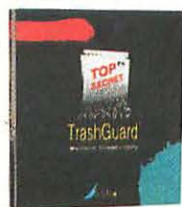


\$139

TrashGuard

Delete files forever, with TrashGuard. Using the Trash Can to delete a file only makes the space available, but does not erase data. Any snooper with a file recovery utility can retrieve “Trashed” files easily. TrashGuard not only deletes files, it actually removes them from your hard disk. It even complies with D.O.D. standards. TrashGuard can be set with a time delay in case you change your mind. You can “train” TrashGuard to discriminate between confidential files and normal files.

Publisher: ASD Software
UTI0322



\$49

WindowWatch

Keep track of how you are using your Macintosh. WindowWatch automatically generates a timesheet in the background, as you work. It can be set to track window or application usage. Use it to record time spent on a project, justify new hardware or software purchases, or document use of your Mac at home (for the IRS). WindowWatch operates entirely in the background, never interrupting normal use of your Mac.

Publisher: ASD Software
UTI0264



\$89



Cachet

Cachet, Editor's Choice for “Software Product of the Year” *MacUser*, March 1992, lets you edit desktop color images in a remarkably intuitive and accurate way by using your own eyes! With Cachet's unique Edit-by-Reference feature, you'll never make

another printing mistake because you adjust the on-screen colors of your image to match a reference image that has already been printed. Other features include MultiChoice, a quick way to correct color, EfiColor for matching color to any printer and more!

Publisher: Efi
GRA0432

\$399

TimesTwo

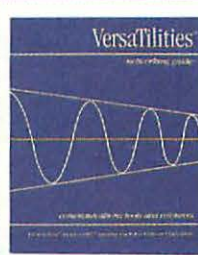
TimesTwo is an easy, one-time installation that expands your disk to twice its size in minutes. Your PowerBook's 40 MB becomes 80 MB instantly. Your IIfx's 80 MB disk swells to 160 MB. Without ever opening your Mac or installing expensive hardware, you can



expand your disk space in minutes. *MacUser* Editor's Choice Award Finalist!

Publisher: Golden Triangle
UTI0343
Also available:
Times Two 800K
UTI0344 \$99

\$99



VersaTilities

VersaTilities provides a suite of tools for use with Apple CommToolbox and MacTCP applications. VersaTilities' tools provide support for Telnet and FTP (Client/Server) on LocalTalk, Ethernet and Serial (via SLIP) networks. VersaTilities' SLIP support enables Mac

users to remotely access the Internet by dialing into a SLIP server.

Publisher: Synergy
COM0140

\$59

IntelliDraw

Aldus IntelliDraw defines an exciting new category of drawing program, with intelligent features that give you an easy new way to draw, refine and visually experiment with your ideas. Innovative smart tools link graphics in your drawing so they respond to changes automatically. Create visual “what-if” scenarios with features like intelligent clip art & templates, automatic symmetrical objects, and dimensions lines. Auto-alignment, shape blending, powerful text handling capabilities, unlimited layers, color gradients, standard draw tools and more.

Publisher: Aldus GRA0354
Also available: IntelliDraw
Competitive Upgrade
SID0028 \$99



\$199

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●BUS0285 IN CONTROL 2.0	89
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●BUS0188 Lotus 1-2-3 for Macintosh 1.1	299
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●BUS0285 The Microsoft Office 3.0	475
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●FIN0348 Accountant, Inc. 3.5	335
●WRD0057 ExpertWriter	29
Teleware, Inc.	
●FIN0387 M.Y.O.B. 3.0	109
T/Maker Co.	
●WRD0060 WriteNow Workshop	85
WordPerfect Corporation	
●WRD0041 WordPerfect 2.1	289
COMMUNICATIONS & NETWORKING	
Apple Computer, Inc.	
●NET0250 AppleShare 3.1	969
●COM0131 AppleTalk Remote Access	159
●COM0128 Macintosh PC Exchange	69
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●NET0125 DaynaPORT E/Z	269
●NET0076 DaynaPORT E/SE	149

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●NET0007 PhoneNET+ Plus, SE & II	31
●NET0019 PhoneNET Star Controller	899
●NET0329 Timbuktu 5.0	129
●NET0034 Timbuktu/Remote 3.0	129

PowerMerge

File Synchronization for the Mac. If you use more than one Mac, Power-Merge makes sure you are always working on the latest version of your files on each Mac. It shows which files are going to move, notifies you of conflicts if files have changed on both Macs and creates a Log of what was updated.

Publisher:
Leader
Technologies
UTI0312

\$79

Global Village (full line available)

●PowerPorts	Call.
●MOD0065 Bundle 9600 ULTRASmartModem	679
●MOD0077 OPTIMA 96 for the Mac	399
●MOD0096 OPTIMA 24 Bundle	145
Insignia (Full line available)	
●UTI0174 AccessPC 2.0	59
●COM0144 Soft PC Universal 3.0	89
PowerTools	
●MOD0115 24/96 Send/Receive Fax Modem	129
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Prometheus	
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Shiva	
●NET0246 LANRover/L	599
TechWorks	
●NET0133 Graceland 2.0 50-user	279
White Pine Software	
●COM0143 Mac 320-VT320 Emulator 1.1	95

EDUCATIONAL & ENTERTAINMENT

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●CDR0042 Just Grandma and Me-CD-ROM	35
●GRA0268 Kid Pix 1.2	35
Centron Software, Inc.	
●ENT0289 CasinoMaster Deluxe Color Version	45
●ENT0440 Crossword Creator	39
Optimum Resource, Inc.	
●EDU0355 Stickybear's Reading Room	35
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●Excel 4.0, Word 5.1, Filemaker Pro 2.0	ea.49
Software ToolWorks	
●MUS0092 Miracle Piano	349

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●CAD0032 Design Your Own Home-Architecture	ea.59
Adobe Systems, Inc. (Full line available)	
●FON0295 Adobe Type Reunion	39
●FON0439 Adobe TypeStylar 2.0 w/ATM	127
●GRA0371 Adobe Premiere 2.0	429
●GRA0403 Illustrator 3.2 (w/ATM 2.0)	369
●GRA0430 PhotoShop 2.5	549
Aldus	
●GRA0305 FreeHand 3.1	395
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●GRA0112 SuperPaint 3.0	99
●DTP0072 PageMaker 4.2	495
●UPG0003 PageMaker 4.2 Upgrade	95
●DTP0080 Personal Press 2.0	99
Apple Computer, Inc.	
●GRA0347 QuickTime Starter Kit	149
Clarix	
●GRA0350 MacDraw Pro 1.5	275
Dream Maker	
●GRA0105 Clippings Vol. 1 Business Images	69
●GRA0412 Painter 2.0	279
Graphsoft	
●BUS0184 Azimuth 2.1	299
●CAD0024 Blueprint 4.0	219
●CAD0030 MiniCad-4.0	595
Gryphon Software	
●GRA0378 Morph	89
Quark, Inc.	
●DTP0071 XPress 3.1	549
Ray Dream	
●GRA0383 addDepth	125
Softkey Software	
●CH0489 KeyFonts	49
Softsync Publishing	
●GRA0356 Expert Home Design	29

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CoStar	
●INP0196 AddressWriter Envelope Printer	479
Datadesk International	
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Kensington	
●INP0231 Turbo Mouse (SE or II) 4.0	109
Microtek	
●INP0246 Microtek ScanMaker II	929
●INP0247 ScanMaker II XE	1239
Mouse Systems	
●INP0132 Little Mouse ADB	74
●INP0232 PowerPad	79

Typstry

Pixar Typstry is exciting software which creates dimensional text from Type 1 and TrueType fonts. Move, rotate, scale and extrude words or individual letters and decorate fonts in any number of interesting appearances. Create images for logos, publishing, design, presentation graphics or multimedia. Typstry invokes RenderMan magic to transform a simple word into an extraordinary picture.

Publisher:
Pixar
FON0482

\$189

SuperMac	
MON0224 20" SuperMatch Color Display	1599

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Battery Technology Inc.	
ACC0840 Battery for Powerbook	59
CMG Computer Products	
ACC0837 Powerlock for Powerbooks	49

White Knight V.11

White Knight will give you powerful communications at an affordable price. Geared to all levels of experience, it supports file transfer protocols like ZMODEM, 3 styles of YMODEM, Flash & 3 styles of Kermit. Terminal emulation supports TTY, VT52, VT100 & VT102 as well as 32 bit color QuickDraw & large monitors. Comes with a FREE copy of Olayto.

Publisher:
FreeSoft
COM0060

\$85

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●UTI0334 Symantec Antivirus for Mac 3.5 (SAM)	65

Retrospect

Retrospect continues to dominate the market for network backup, and for good reason!



MacWEEK 1992 Diamond Award. Retrospect® 2.0 provides both incremental backup to protect daily work and true archiving to remove inactive files from your hard disk to a storage device. Advanced scripting and scheduling provide automatic, unattended backup to all desktop volumes.

Publisher:
Dantz
UTI0227

\$147

FolderBolt

FolderBolt! If you wish to protect folders and applications from changes, copying or unauthorized use, then you need FolderBolt. It's fully integrated into the desktop and makes management of your Macintosh a breeze. UTI0212 \$75



Publisher: Kent Marsh, Ltd.
Also available: FolderBolt/
NightWatch II Bundle
UTI0338 \$129

NightWatch II*

NightWatch II! If controlling the entire hard disk is your principal concern, NightWatch II is the answer. It protects your hard disk while you're away and prevents access and erasure via individual user preferences. UTI0262 \$89*

\$89*

UnMouse

The UnMouse is an intuitive touch tablet. Move the cursor effortlessly. Just slide your finger over the glass, then press to click. Plus it comes with special templates, each offering up to 60 programmable functions keys. And it even works with a stylus.

Manufacturer:
MicroTouch
INP0084



\$145

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Ink-Jet Printer

StyleWriter II

PROS: Small footprint; good-looking gray-scale printing; sharable over network; improved paper capacity and handling; improved type quality. **CONS:** Gray-scale printing is slow. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** \$359.



I'VE ALWAYS LIKED APPLE'S STYLE-Writer. It wasn't the fastest, or even the cheapest, ink-jet printer available. But it was always the best-designed ink-jet and the one that fit best on my small desk in my home office. The new StyleWriter II is even better. It retains the best features of its predecessor, fixes some problems of the original design, adds new features that make it more versatile, and costs less than the old StyleWriter.

Faster by Far

APPLE USED A NEW PRINT ENGINE FOR the StyleWriter II, one based on Canon's bubble-jet technology that averages 2 pages per minute in Canon's tests, twice as fast as the 1-ppm rating of the original StyleWriter. In Macworld Lab's benchmark tests of font-intensive documents (with multiple fonts, Courier fonts, or TrueType fonts) the StyleWriter II was much faster than the original; the II printed the test documents in 45 percent to 83 percent of the time it took the StyleWriter to print the same documents.

It doesn't just print faster, the type looks better. By redesigning the printer's paper-handling path, Apple engineers were able to move the engine's print head closer to the paper, put more tension on the paper itself, stretch it tightly over a larger roller, and move the print head in smaller increments down the page. The combination of a flatter paper surface and a closer print head means that the ink

doesn't spread as much when it hits the paper, sharpening edges and creating crisper type at 360-dpi resolution.

Even better, you're not limited to printing just text and black-and-white images anymore. Apple's new Quick-Draw printer driver, GrayShare, adds the capacity to print up to 100 levels of gray with an 85-line screen, producing beautiful gray-scale images. While I don't recommend using a StyleWriter II for high-end photographic reproduction, GrayShare provides great-looking images for invitations, newsletters, posters, and letters. Although gray-scale takes much longer to print, GrayShare is smart enough to examine pages first and do only gray-scale calculations if there are images on the page, saving time on multipage documents.

GrayShare also provides the ability to share a StyleWriter over a network. When you select the StyleWriter II in the Chooser, a Setup button allows you to publish the printer on the network, password-protect it, and keep a log of printer usage. When someone wants to print to the shared StyleWriter, the print job is processed in the background on the connected Mac. This processing causes a slowdown on the host Mac, but it is a nice solution for a small office or for back-up when a shared laser printer goes out of service.

Improved Design

THE STYLEWRITER II ALSO SPORTS A sleeker and sturdier look than its predecessor, which seemed slightly flimsy to me. The external power supply has been integrated into the body of the printer, adding an extra pound (although the printer is still less than 7 pounds). The two-part body has been fused into one more-solid-feeling unit, the wire paper



StyleWriter II from Apple Computer

trays have been recast in plastic, and the paper tray now holds 100 sheets of paper instead of 50 sheets. Printing envelopes is easier. You can print up to 15 at a time, feeding them in automatically through the paper tray, rather than manually.

Ink-Jet Competition

THE STYLEWRITER II'S MAIN COMPETITOR is Hewlett-Packard's DeskWriter. In the past, the DeskWriter was the ink-jet printer of choice for those who wanted speed or to share the printer over a network. Now you can share a StyleWriter II over a network too, and the StyleWriter II narrows the performance gap almost to a draw (although the DeskWriter retains a slight edge); benchmark tests show the StyleWriter II to be faster than the DeskWriter on the multifont Word and PageMaker tests and slower on others, like the FreeHand and MacDraw tests. The big difference between these printers today, however, is in print quality. The StyleWriter now surpasses the DeskWriter, producing sharper type and line art, and superior gray-scale images. The competition between two such good printers is bound to be good for consumers; the winner of this round is Apple's StyleWriter II.—LIZA WEIMAN



How Fast Is the StyleWriter II?

Tests were conducted on a Mac IIci running System 7.1, with a cache card installed, 8MB of RAM, a Quantum Pro 80 internal hard drive, AppleTalk on, and background printing off if possible.

Times are in seconds.
Shorter bars are better.

	Multiple Fonts	Courier	MacDraw Pro	Aldus FreeHand 3.1	Aldus PageMaker	TrueType
	Print speed for a typical multiple-font document. We used a seven-page Microsoft Word 5.0 document containing a variety of fonts, sizes, and styles.	Printer throughput for a two-page Microsoft Word 5.0 document containing double-spaced 12-point Courier text in plain, bold, and italic.	Print speed for complicated drawings without many special effects. We used a graphic containing more than 2000 simple objects and several lines of Helvetica text.	Print speed for complex graphics that include special PostScript effects. We used an illustration that includes nonlinear blends and Bézier curves.	Print speed for a typical high-end desktop publishing job. We used a four-page newsletter containing several fonts, a MacPaint image, and three gray-scale TIFF images.	Print speed for TrueType, using a one-page Microsoft Word document containing four fonts.
Hewlett-Packard DeskWriter						
Apple StyleWriter II (normal)	343	499	91	236	705	67
Apple StyleWriter (best)	247	394	170	1577	432	69
Apple StyleWriter (best)	582	916	210	531	546	109

Mac Plus Upgrade System

MicroMac Plus Upgrade System

PROS: Speeds up the Plus dramatically.**CONS:** Requires Plus system board to assemble the MicroMac. **COMPANY:** MicroMac Technology (714/362-1000). **REQUIRES:** Mac Plus; 4MB of RAM; hard drive. **LIST PRICE:** \$998.

THE MICROMAC PLUS UPGRADE SYSTEM from MicroMac Technology for the Mac Plus is not a board that fits inside the Mac, it's a system case into which you put your Mac Plus's system board and floppy disk drive. The MicroMac System that I assembled also came with MicroMac's full-page monochrome monitor and ZeroSlot video board, MicroMac's 68030-based 25MHz MultiSpeed Accelerator, and Connectix's Virtual RAM-disk software.

To assemble the MicroMac System you remove the Mac Plus's logic board and floppy disk drive, remove the components that are shipped inside the MicroMac System, and then reassemble the Plus and MicroMac parts in the MicroMac system case. You now have a low-profile Macintosh, with a slightly larger footprint than that of a Plus. The monochrome full-page display (included with the bundle I tested) can sit on top of the system case. The opening for the floppy disk drive is on the front right of the MicroMac case, where you'd expect it. MicroMac will buy the Plus case (currently for \$30), reducing the incremental cost of the upgrade system. (For additional upgrade options, see "Expanding a Compact Mac," in this issue.)

Although the kit comes with most of the necessary tools, it does not include an antistatic wrist strap, which is used to pre-

vent an electrical charge from possibly blowing out any of the components on the circuit boards. In the list of tools you need, the manual mentions an antistatic wrist strap, but doesn't say why you need the device. (You can buy one inexpensively at most dealers.) Be sure to use a wrist strap, or an antistatic mat. On a more important point, the manual was quite clear about the potential for harm to the installer from the high-voltage wire, a part of the Mac Plus's display system that can deliver a dangerous electrical charge even long after the Plus has been turned off and unplugged.

Once I had gone through the manual completely and laid out all the parts, installation was fairly straightforward and the instructions were clear. The photographs in the manual were a little murky and sometimes didn't show as much detail as I wanted, but I was still able to install everything and get things up and running. Although the assembly process took a little longer than the hour stated in the manual (I recommend at least an hour's study of the manual before you begin), once the computer was put together in the MicroMac system case, it worked well. The overall speed improvements were impressive, and the MicroMac system worked with all the software I tried except one game that does not follow the Apple guidelines for software development. The full-page monitor is also a big improvement over the small screen of the Mac Plus.

So, would I recommend the MicroMac Plus Upgrade System? Overall, I recommend you look at the prices of some of the new low-end Macs and think about whether I needed a full-page monochrome monitor. If you want to stick with a monochrome system, the MicroMac System is fine as an accelerator and it lets you add an external monochrome monitor. But if you want to move up to color, I suggest you buy an LC II or LC III for just a little extra money.—TOM MORAN

Calendar Software

Now Up-to-Date 2.0

PROS: Reminder control panel enables you to add and edit calendar events without launching program; fully customizable display; plentiful keyboard shortcuts. **CONS:** Some conflicts with Reminder INIT. **COMPANY:** Now Software (503/274-2800). **REQUIRES:** Mac Plus; hard drive; System 6.0.5. **LIST PRICE:** \$99; five-user package \$449; ten-user package \$799.



WITH THE RELEASE OF NOW UP-TO-DATE 2.0, Now Software has brought us one giant step closer to the ultimate calendar program. Not only does this update address the inadequacies of version 1.0, but it also provides outstanding enhancements to many of the program's already admirable features. The result is a calendar utility that is almost irresistible.

The new version still offers brisk performance and multiple views of your schedule in graphically pleasing monthly, daily, and weekly formats. But now there are more and better ways to organize your data—whether you're a private user or part of a group sharing calendar information over a network.

For example, in the new List view, all calendar events can be viewed in a text-based list format. The view can include events from a single day or for any number of days, weeks, or months you define. And you can sort your list by event type, date, priority, or any of ten other possible criteria simply by clicking on the appropriate field heading.

Another dramatic enhancement is the addition of several new designations for calendar events, including a To-Do category for items that are not time-specific. There's also a new Undated To-Do designation for general to-do items that don't carry a specific deadline. To-do items automatically carry over to the next day until they are checked off (which can be done with a keyboard command.)

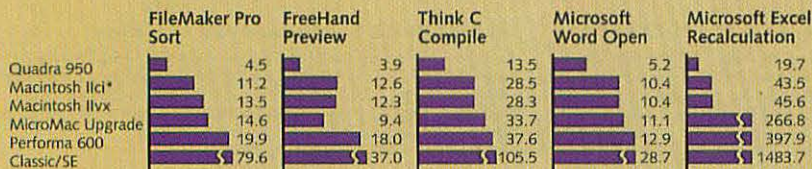
The monthly calendar view has been greatly improved. Text in calendar events now wraps within each date cell, so titles aren't abruptly cut off. And you can scroll through multiple entries for a certain day by clicking on arrows within the date cell. In the Event Info dialog box, descriptions can be up to 32K of comments, and they appear in a scrollable window.

In the daily view, you can use a keyboard shortcut to zoom into the day's graphical time line. You can view the



Rating the MicroMac

Times are in seconds. Shorter bars are better.



Macworld Lab's application tests included the following operations: sorting an unindexed field of a 397K FileMaker Pro document with 1869 records; previewing a 59K FreeHand document; compiling a 73K 17,757-line Think C application; opening a 212K Word 5.0 document; and recalculating an 809K Excel spreadsheet that contains mostly transcendental functions.

*Apple 64K standard cache card installed.

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entire day from midnight to midnight or a single hour, in minute-by-minute increments. This is a major advance over version 1.0.

Probably the best of the new features is the updated Reminder control panel, a separate component that enables you to add, delete, or modify any event on your Up-to-Date calendar, without launching the program itself.

When Reminder is installed, a clock appears on the menu bar, regardless of which application you're running. Clicking on the clock produces a pull-down menu containing all the day's appointments, to-do items, and so forth. By selecting New Event or Edit Event from the menu, you can edit calendar items and set alarms to notify you of upcoming events through an alert dialog box or a flashing message on the menu bar. Better still, you can define a hot key to open the Reminder dialog box at any time to modify calendar events. Some users have reported minor conflicts with the Reminder INIT, but Now Software says an update is in the works to fix any minor bugs that have been discovered.

Networked users can edit Public Categories, calendar entries shared over a network, while offline; the entries update automatically when you reconnect to the Public Events Server. And even non-networked users can define categories for events and assign each category a unique style and color. In any view, items can be filtered by category or by groups of categories. You can also override the style and color of a category for a particular item to make it stand out.

The program has been beefed up with more and better shortcuts and prints options in all the standard organizer formats. In addition to data export, there's a new archiving function that not only exports data to a text file, but also automatically deletes the exported items from your calendar file to save space.

All in all, Up-to-Date's striking flexibility, ease of use, and streamlined operation are a winning combination. This is one upgrade that is definitely worth the price.—JOSEPH SCHORR

Joe's Calendar					
March 1993					
Date	Start	End	Title	Category	Type
Mar 1993			Supervisor's visit on site	Personal	Don
3/7/93			Submit proposal	Personal	To-Do
3/8/93	10:00 AM	10:45 AM	Discuss next week's assignments	Deadlines	App
3/8/93	9:00 AM	10:30 AM	Meet with Rev. Cravens	Newspaper Assignment	App
3/8/93	1:00 PM	4:00 PM	Staff meeting		
3/9/93	11:30 AM	12:30 PM	Pat's Lunch		
3/9/93	7:00 PM	9:30 PM	Finger food		
3/10/93	8:00 AM	10:15 AM	Interview		
3/10/93			Meet with Turn		
3/11/93			Teach		

Sorting It Out The new List feature presents your to-do items and appointments in an organized text-based format.

Multimedia Authoring Software

MovieWorks 1.1

PROS: Includes modules for editing graphic, text, and sound elements; button links allow for interactive presentations. **CONS:** Unbearably sluggish performance; crude editing tools. **COMPANY:** Interactive Solutions (415/377-0136). **REQUIRES:** Mac LC; 5MB of RAM; 256 Colors; System 6.0.7; QuickTime. Recommended: 8MB of RAM. **LIST PRICE:** \$395.



MOST MULTIMEDIA AUTHORING tools are designed to integrate pre-existing graphics, sounds, animations, and QuickTime movies into a cohesive production. MovieWorks, an entry-level multimedia package, goes one step further, giving you the tools to actually create and edit the sounds, graphics, text, and movies you want in your production.

This all-in-one approach has some merit—it means you can produce multimedia presentations without owning other graphics- or sound-editing software. But, as it turns out, MovieWorks is too sluggish and awkwardly designed to be worthy of recommendation.

MovieWorks has four separate modules. You use the main application, Composer, to assemble and play back presentations. The Paint, Sound, and Text modules are used to create and modify the graphics, digitized recordings, and lines of text that appear within a presentation. Under System 7, the paint, text, and sound editors can be launched from within Composer, though this requires 8MB of RAM—twice the amount needed to run Composer by itself.

Alternatively, you can import sounds, pictures, text, and movies created with third-party applications into Composer. The program supports PICT graphics, PICS animations, QuickTime movies, and sound in AIFF or snd formats.

Once you import a new source file (called a *track*), you can position it anywhere on the presentation stage, or background, and you can apply any number of transitional and animation effects to control each element's entrance and exit. The Tracks menu provides access to 14 different transitional effects, such as dissolve, wipe, and blinds (Macromedia's Action provides 30 transitional effects; Passport Designs' Passport Producer offers 18). There's also a scaling function, to zoom objects in and out to a predetermined size for dramatic effect.

To add even more zip to a production, you can animate graphics or text

tracks, moving them across the stage in a selected path. The tool palette offers five different kinds of paths. For example, you can have a title fly in from off screen along a straight path, or make a graphic element travel in a circular or rectangular path along the perimeter of the screen. Objects can also accelerate along a path and decelerate as they stop. This Ease In and Ease Out effect makes for natural-looking animated movement on screen and is one of MovieWorks' unique features.

You can string together MovieWorks presentation segments sequentially, or you can insert buttons into the presentation so that a segment plays only when a user clicks on a particular button. This allows you to create self-running interactive presentations.

To adjust the timing of events within each segment, you can view your presentation in the TimeView window, in which each presentation element is represented as a bar on a time line. You drag the bars to set the timing of entrances, exits, transitions, and so on.

Once you've painstakingly imported each element; set animated paths, transitions, or other effects; and precisely set the timing of each event, you'll want to play back the results. This is where things really bog down.

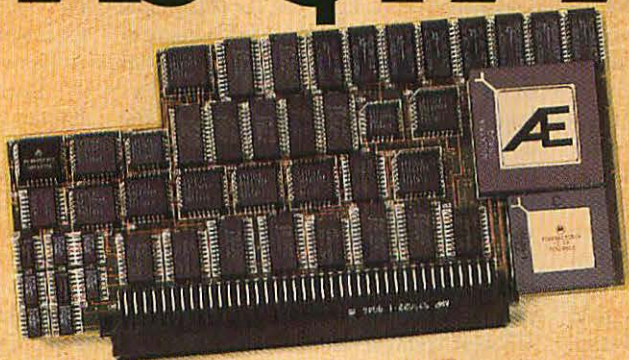
MovieWorks records each segment of a presentation in QuickTime movie format, so you must compress each sequence before you can play it back with accurate timing. The compression takes a long time and you must compress frequently—even minor modifications won't show up without recompression. If your presentation is made up of numerous sequences, you spend a lot of time waiting.

But even when you're not waiting, the program offers inferior performance. The sound, graphics, and text editors are particularly weak. The Text module offers no tools for kerning text, while the Paint component is painfully slow and lacks the polish of a full-scale paint program.

The first release of MovieWorks was horribly bug-ridden. With version 1.1, the company claims to have fixed more than 100 bugs, but problems persist. For example, a command that is supposed to remove the menu bar from your screen when in Play mode simply doesn't work.

For now, MovieWorks is a good idea poorly executed. It makes assembling a presentation far too time-consuming, and it makes you work too hard to get satisfactory results. The paint, sound, and text editors aren't worth the trouble. Other packages, such as Action and Passport Producer, contain many of the same features, but operate smoothly and are easier to learn.—JOSEPH SCHORR

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Circle 167 on reader service card

Database Server

4D Server 1.0.1

PROS: Simple installation and administration; distributed multitasking; fast multiuser performance. **CONS:** Doesn't include backup or SQL connection; expensive; only one open database at a time; hardware-key copy protection.

COMPANY: ACI US (408/252-4444).

REQUIRES: Mac Plus; 2MB of RAM (plus 130K per user); hard drive; LocalTalk, Ethernet, or Token Ring network using AppleTalk; System 6.0.5. **LIST PRICE:** For up to three users \$1495; six users \$2495; ten users \$3495.



4TH DIMENSION IS THE MOST POPULAR relational database for the Mac, but its performance in multiuser mode has been a long-standing source of complaint. That's all been fixed now. 4D Server uses the ingenious multitasking technology built into 4th Dimension 3.0.1 (see *Reviews*, *Macworld*, April 1993) to make it appear that each client has the full resources of the server. An installation includes server software (with an ADB port hardware key) and a fixed number of concurrent client licenses; each client user can work through the 4D tutorial and then pretend to be a single-user site (see "Sign-Up Sheet"). With a 5-client package, for example, you could install client software on all 20 Macs on a net, but the server would check to allow only 5 active 4D users at a time.

To simulate a network in a typical small office, I was sent a 3-client setup, and I installed the software on a Mac IIci for a server with a humble LocalTalk connection to three SEs. In this configuration, there is no measurable difference in the time it takes to run a task in single-user 4D on the IIci and to run the same task on an SE client. The key to this performance boost seems to be that 4D client-server architecture effectively loads transaction processing onto the server (usually the fastest machine on the net), routes client transactions through a data cache, and minimizes the amount of data actually sent down wires in connection with each transaction. This is far more sophisticated than the file-sharing arrangements that characterize most multiuser databases; it supposes that both client and server are running copies of the same program. With a Quadra server and Ethernet boards in the

client Macs, you can calculate that 4D running on a busy 10-client network would still appear to the clients to be nearly as fast as single-user 4D on the Quadra. For 4D developers, this is great news, since 4D allows several programmers to work on database design in the same database at the same time, running a theoretical maximum of 128 processes per user. The real limitation in 4D Server now is not network speed, it's that only one database can be open at a time. For many businesses, this is unacceptable.

Administration is admirably simple. There's a single Process window that shows the status and activity (number of processes) of database clients, server memory available, and data cache hit ratio. You can click on the cache hit ratio thermometer and open it to get an indication of the types of data flowing through the cache; an astute administrator can use this to tune the cache size for minimizing hard-drive access. The administrator can also set levels of password protection not only over user access to data but to individual design elements, such as layouts, as well.

It is possible, however, for reasonable persons to object to ACI US's current marketing practice of selling each aspect of its database products in chunks. Perhaps it's excusable but unpleasant that the developers want more money for any kind of SQL access, but the requirement for the 4D Backup module is essentially built into the server—the Log File items (inactive without Backup) appear in the File menu. Since backup is absolutely necessary for a network database, it's as if ACI US were trying to sell the database Search function as an add-on. Perhaps in subsequent versions the price will go up a bit and the Backup module will be bundled.

If you use 4D on a network and don't feel that you were born into this world to have your time wasted, you need 4D Server. After a few days' experience with it, your main complaint will be that ACI US didn't get the product out years ago.

—CHARLES SEITER

Meeting Date	Meeting Time	Contact	Topic
1/7/90	4:30 PM	Barlet	Project 20325: The project is moving towards completion
1/8/90	4:40 PM	Blumenfeld	Work meeting: Meeting progress towards completion
1/9/90	12:40 PM	Bruckner	Meeting with the design project
1/10/90	7:30 PM	Le Car	Personal party
2/1/90	10:00 AM	Le Car	Personal party
2/14/90	10:00 AM	Projector	Service presentation
2/16/90	2:00 PM	White	Progress Report
2/18/90	9:00 AM	Hurrier	Meeting with the construction engineer
2/25/90	12:00 PM	White	Progress with the window construction
3/2/90	2:00 PM	Butler	Progress Report
3/12/90	5:00 PM	Dodger	Delivery
3/25/90	2:00 PM	Smiley	Service

Sign-Up Sheet At a client node on the network, you can barely tell you're not a single-station 4D user. The difference is that, while you're arranging meetings in a database like this one, client-server architecture lets users work on the schedule together.

Typing Tutors

Dvorak on Typing 1.0

PROS: Good lessons. **CONS:** Slow; minimal entertainment value. **COMPANY:** MacPlay (714/553-3530). **REQUIRES:** Mac Plus; 2MB of RAM for color; hard drive; System 6.0.5. **LIST PRICE:** \$49.95.



Mavis Beacon Teaches Typing 2.0

PROS: Well-designed; educational; fun to play. **CONS:** Insufficient documentation. **COMPANY:** The Software Toolworks (415/883-3000). **REQUIRES:** Mac Plus; 2MB of RAM for color; hard drive; System 6.0.7. **LIST PRICE:** \$49.95.



IN A RECESSIONARY ECONOMY, EVERY skill you can add to your résumé counts. Though employment agencies now ask job seekers if they can operate fax machines and modems, they also want to know the bottom line: Can you type?

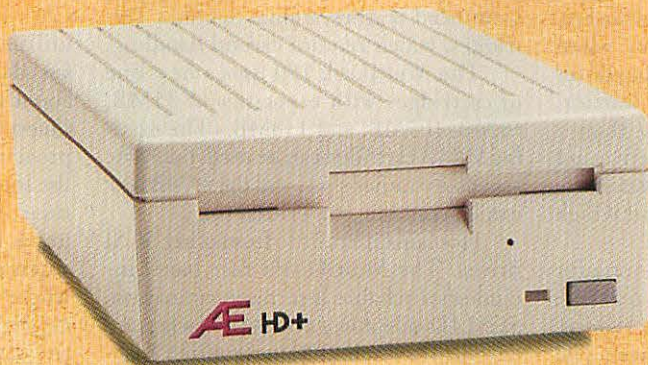
Both Dvorak on Typing (DOT), named after computer-industry pundit John C. Dvorak, and Mavis Beacon Teaches Typing 2.0 guide you through typing lessons and chart your progress, calculating your words per minute and accuracy, and noting your problem keys. Lesson topics include keyboard rows, hand placement, vocabulary, and the ten-key numeric pad. Both programs display charts showing your progress, though Mavis's are substantially more detailed, organized by finger, hand, and row.

DOT has beginner, intermediate, and advanced lessons; the latter two levels require you to take a test to assure that you're up to par. But every time you re-enter DOT and want an intermediate or advanced lesson, you have to take the test, or be limited to beginner lessons. The program didn't remember my typing speed, and when I declined to retake the test, it gave me only beginner lessons. In contrast, Mavis advised me when to up my speed settings, but it didn't make me take a test before I did a drill.

Both programs allow you to customize your lesson. DOT makes you input your lesson directly in the program, while Mavis lets you import text files. Unless you customize your lesson, DOT forces you to type two spaces after a period, a habit I'm trying to break in this age of proportional fonts. Mavis lets

continues

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Circle 301 on reader service card

you type one space after the period.

Both programs can teach you the Dvorak keyboard layout, a reorganization of the traditional keyboard layout meant to increase your typing speed. (The layout was designed by August Dvorak, no relation to John, in 1930.) MacPlay says a future DOT update will include a file allowing you to use the Dvorak keyboard in all applications. Mavis doesn't work with actual Dvorak keyboards, but the company expects future versions to be compatible. Mavis shows how to position your hands and displays a diagram showing how typists should sit to reduce the physical strain of repetitive motions.

DOT's interface is ugly and DOS-like, though MacPlay promises a redesign. Mavis is more colorful. DOT takes up a whopping 5MB of hard drive space, compared to Mavis's 2MB.

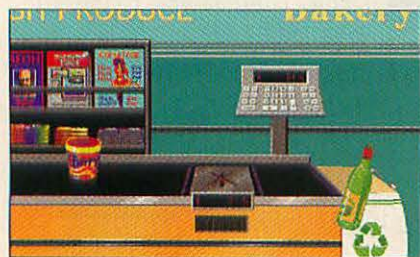
You can select one of three characters, including Dvorak himself, to be your tutor, who comments when you've completed a lesson (it was hard to believe my tutor's remark, "I wish I could type that fast," when I typed 23 wpm). I found the voice irritating, not to mention insincere.

Both programs offer a game when you tire of lessons. In DOT, typing faster encourages a knight to attack a warrior. It's more an animated display than a game, since there's no real objective and no way to win; you can't even watch the action, because you have to read which letters to type.

Mavis includes two games—one for typing lessons and one for the ten-key; both are a lot of fun. For typing lessons, you're driving a race car: the faster you type, the faster you go. If you're working on numbers, Mavis provides you with a temporary job as a grocery clerk. You type in the price of food as it moves along the conveyor belt. If you're correct, the food lands in your recycled paper (not plastic) bag; if you're wrong, it falls to the floor.

If being entertained while learning to type interests you, choose Mavis. It costs the same as DOT, but provides varied environments, interesting lessons, and good games. For \$49.95, Mavis is too good a deal to pass up.

—JOANNA PEARLSTEIN



Mavis Beacon Learning the ten-key pad is as easy as checking groceries at a supermarket.

Removable-Cartridge Drive

MultiDisk 150

PROS: A whopping 150MB disk capacity with speed to match fixed hard drives; hardly floppy-based cartridges can withstand abuse unthinkable with SyQuest removables; fast, reliable formatting software. **CONS:** Media cannot be partitioned; difficult to seat SCSI cables.

COMPANY: Iomega Corporation (801/778-1000). **REQUIRES:** Mac Plus; System 6.0.5.

LIST PRICE: \$1225; Macintosh Interface Kit \$49; 150MB disk \$245; 105MB disk \$169; 65MB disk \$129; 35MB disk \$79.



OMEGA'S BERNOULLI REMOVABLE drives have long played second fiddle to SyQuest technology in the Macintosh world. I've always wondered why, since Bernoulli cartridges seem better suited to transportable use. Because the read-write heads float above the media in Bernoulli drives, the cartridges are virtually free from head crashes, unlike SyQuest cartridges, which require careful handling.

The MultiDisk 150 uses a new line of cartridges with capacities of 35MB, 65MB, 105MB, and 150MB. (The existing 90MB cartridge can be used, but write speeds are rather slow, and the 44MB disk can be read but not written to.)

Hookup differs little from other SCSI drives. The MultiDisk's rear panel includes switchable internal termination, SCSI ID selector, two 50-pin jacks, and an on/off switch. The only glitch I observed in hooking up the drive was the difficulty in seating the SCSI cable onto the jack. It was a snug fit, and one clamp came off the jack but was easily reattached. This was only a minor annoyance.

The printed Read Me setup sheet is simple to follow but suggests that the Bernoulli performs to its maximum potential if it's the last physical item on the SCSI chain. I tried the Transportable in the first, third, and last (sixth) position on the SCSI chain of a Mac IIci, and I found no measurable change in performance.

The 5¼-inch Bernoulli cartridges are slightly thinner and much lighter than their SyQuest counterparts. They look like overgrown floppy disks, with a large disk shutter at one end, and a write/no write button on one corner. Iomega's sales literature claims "Bernoulli disks are the only ones capable of handling 1000Gs of shock force—the equivalent of an 8-foot drop." To test this statement, I dropped a cartridge from the ceiling to a hard tiled floor—about 8 feet. True to the company's claim, a full suite of disk tests with

Iomega's Workshop formatting utility showed the cartridge to be in perfect working order. While in theory Iomega's floppy-based disks are not as long-lived as the SyQuest cartridges (the difference between floppy-based media and hard, metal platters), the Iomega disks carry a five-year unconditional warranty.

All Bernoulli cartridges come preformatted and need only be initialized with Workshop's Erase Disk function. It takes just a few seconds to get the cartridge up and running. Workshop offers some unique features including Verify (which cuts write speed virtually in half, but is recommended to ensure data integrity), Auto Flag, and an Auto Sleep mode, which powers down the drive after a specified interval of inactivity. There is also a display showing estimated disk and formatting life of the cartridge. To speed up cartridge performance, Workshop allows you to set aside RAM as a cache. Like the disk cache in System 7, the MultiDisk cache stores frequently used data in RAM to speed up read performance.

The MultiDisk 150 is fast. Both La Cie's Time Drive and FWB's BenchTest utilities showed sustained read-write speeds of 1050K per second and more, about 15 to 20 percent faster than my SyQuest 88. Though access time never approached the 18 milliseconds claimed by the Iomega manual (I got an average seek time of around 18ms, but access time was much higher), this was only noticeable when deleting a large number of files, where there seemed to be a slight delay as files were removed from the disk. Since the read-write heads have less area to cover on the 35MB cartridges, overall speed increased another 10 percent or so.

Workshop was fast, reliable, and seemingly bug free. The only downside is that disks cannot be partitioned. The drive itself makes a whirring sound not unlike a floppy drive on helium, and is much more pleasant than the grating sound typical of SyQuests. Customer service is a toll-free phone call, and responses were always friendly and informative.

Despite the higher price for the drive, Iomega has brought the price of its removable cartridges down to a more competitive basis with SyQuest disks (especially if you purchase Iomega disks in three-packs). The MultiDisk 150 is a viable contender in the removable-drive market. It is fast, reliable, and most important, the cartridges are extremely resistant to mishandling. In a busy production environment, where damage of a removable cartridge (and the loss of valuable data) is always possible, this may be the strongest reason of all to choose Bernoulli.—GENE STEINBERG

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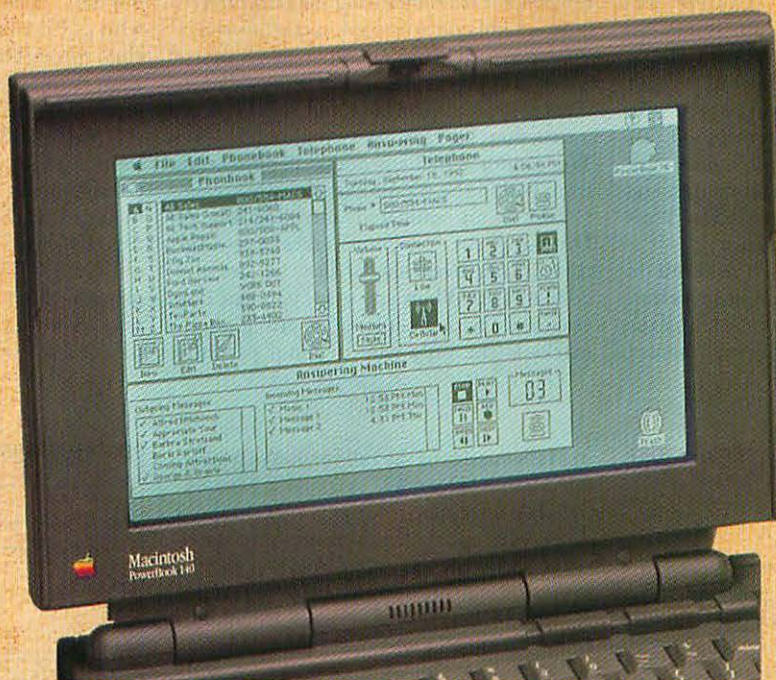
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Training for Macromedia Director

Interactive Training
for Director

PROS: Easy to use; self-paced; unintimidating; includes quick-reference card for Director.
CONS: Hard to replay some segments.
COMPANY: Media In Motion (415/621-0707).
REQUIRES: Mac II; 4MB of RAM;
 13-inch, 8-bit color monitor; hard drive; System
 6.0.7; Macromedia Director 3.0.
LIST PRICE: \$199.



MACROMEDIA DIRECTOR IS A POWERFUL program with a sprawling, frequently intimidating array of features. So intimidating, in fact, according to Media In Motion's research, that fully 30 percent of Director owners do not use the program, instead letting it languish on the shelf. To help the novice become comfortable with this leader in the Macintosh animation and multimedia market, Media In Motion offers Interactive Training for Director.

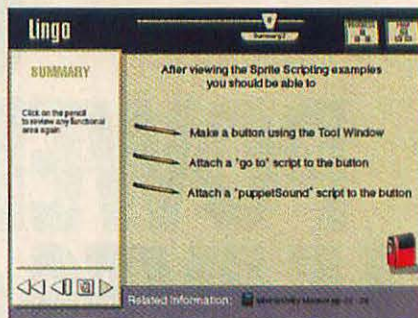
The courseware is itself written in Director and approaches its topic in a clear, lighthearted manner. After completing the approximately four-hour tutorial, a user

should have basic Director skills and a foundation for exploring the program's more advanced features.

The tutorial covers the fundamentals of Director's Studio environment: creating scores and using tempos, transitions, and sounds; importing cast members; using the Panel and Tool windows; markers, frame, and sprite scripting; and QuickTime. Each main subject is broken into sections. VCR-style directional buttons, mouse-clicks, a sliding progress bar, and maps enable you to navigate within topics and from section to section. Along the way, there are reviews, pop quizzes, additional examples of the subject at hand, and references to the topics in Macromedia's written documentation for Director.

The package also comes with a quick-reference card containing descriptions of buttons and controls used in the tutorial, a reference card listing all of Director's shortcuts and key commands (something Macromedia failed to provide), and step-by-step instructions for creating a simple animation. You cannot actually produce an animation from within the training module, however.

After an animated introduction to Director, the program takes the user through an overview of how to use the courseware. When you quit, you can flag your place with a bookmark (setting bookmarks is the only way to jump past the



Review Time Interactive Training for Director divides lessons into digestible pieces and provides frequent opportunities for review.

introduction each time you return to the tutorial). Unfortunately, when prompted to click the mouse to move forward, you cannot move backward until you reach a frame with a directional button. It's frustrating to click through long sequences when all you want is to take another look at something you've just seen.

Media In Motion's courseware does not replace Director's own tutorial, but rather complements the step-by-step lessons included in Director. Interactive Training for Director is superior to Macromedia's old Guided Tour of Director, and may be just the thing for new users who feel lost whenever they see Director's stack of manuals and software disks.—BILL JUSTIN

Numerical and Symbolic Computation

MathCAD 3.1

PROS: Incorporates some of Maple's symbolic-computation capabilities; improved graphing; coordinated with equation handbooks. **CONS:** Needs more documentation on symbolic math; slow scrolling of most documents. **COMPANY:** MathSoft (617/577-1017).
REQUIRES: Mac Plus; 5MB of RAM;
 10MB of free hard drive space; System 6.0.5.
LIST PRICE: \$495.

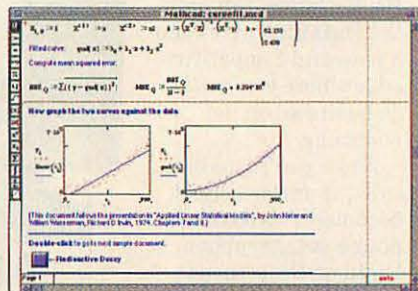


PREVIOUSLY, MATHCAD WAS A SORT of giant scientific calculator and equation solver, competing with TK/Solver and the now-defunct Eureka as an engineering tool. Now, MathSoft has acquired rights to Maple, a symbolic-computation program from the University of Waterloo, Iowa, that is one of the few packages with the scope of Mathematica (the leading symbolic-computation program from Wolfram Research), and incorporated a selection of the most useful symbolic processing routines into MathCAD. The program is not as fast at numerics as Bimillennium's HiQ is, and it offers only a fraction of the symbolic routines available

in Mathematica or the full version of Maple, but MathCAD works.

It's far easier to print a nice-looking four-page report on a calculation in MathCAD than in any other math package. Equation editing is now easier and more intuitive (there are still awkward bits of the programs' DOS and Unix heritage sticking out), and version 3.1 can handle nine open documents, greatly facilitating equation-swapping. Graphs now incorporate more presentation-style features, and can be modified quickly through a single, simple graph-format dialog box. Because a MathCAD page can contain many "live" elements calling for recomputation or replotting, scrolling is often slow, but MathCAD is more convenient than equation processors (certainly more convenient than the equation editor in Microsoft Word 4.0).

MathCAD 3.1 uses Maple routines for Fourier transforms, linear and nonlinear equations, and matrix algebra. Maple is fast, and fortunately the MathCAD interface doesn't slow it down much—in practice you can invert a 10 by 10 symbolic matrix with about a 20-second wait on a IIci, and routine jobs such as factoring polynomials and expanding expressions are handled quickly. For larger jobs (say, dealing with complicated differential equations) Maple V or Mathematica are better choices, but the addition of basic symbolic computation



Plane and Simple MathCAD 3.1 graphs are not fancy, but they look right at home in the type of engineering report that MathCAD specializes in producing.

makes MathCAD much more useful, despite only 30 pages of documentation of symbolics. Finally, MathCAD offers \$99 electronic handbooks that work with version 3.1, covering statistics, electrical engineering, mechanical engineering, chemistry, and physics. If you have a handbook for a favorite topic, you can simply pull live equations and graphs into your MathCAD document. It doesn't get much easier.

MathCAD is easy to learn and easy to use, produces good reports, and is now much more powerful than earlier versions. It still doesn't compete in scope with the largest math programs, but for most science and engineering tasks it's the fastest way to get problems solved.—CHARLES SEITER

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Disk Utility

Safe & Sound

PROS: Clean, simple interface; low price.
CONS: Incomplete set of utilities for some users; documentation includes no explanation of technology. **COMPANY:** Central Point Software (503/690-8090). **REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.5. **LIST PRICE:** \$49.95.



IT'S REFRESHING TO FIND A PROGRAM, especially a utility program, that has stripped out all the clutter for the benefit of the user. Central Point Software's Safe & Sound is a limited but useful disk protection and salvage utility.

A scaled-down version of Central Point's MacTools software package, Safe & Sound fits on a single disk. The six-page documentation clearly instructs you on the use of all the product's features, and the product is an outstanding first disk utility for a novice user.

Safe & Sound is an emergency recovery tool when you're not getting a "clean boot," that is, when your computer's start-up routine is not executing normally. You power up the machine with the utility's floppy disk in the drive for problems such

as the blinking question mark on the disk icon, the dyspeptic Mac icon (the "sad Mac"), or the Finder telling you it can't recognize your drive. The disk launches the utility using its own System file and immediately starts scanning the hard drive. This requires no sophistication on your part.

But Safe & Sound does do some sophisticated disk testing and remediation. Its analysis covers a lot of ground. It checks boot blocks, which contain the references that enable the Macintosh to find the Finder and System files. The program checks the volume information block, which keeps track of critical information, including type of drive format and number of files and folders. It analyzes the catalog tree, which keeps track of the file information you get when you choose Get Info from the Finder, and the extents tree, which keeps track of where the pieces of fragmented and cross-linked files are. And Safe & Sound checks for bad blocks, sections of your hard drive that don't meet the program's specifications for integrity.

Safe & Sound offers a number of other maintenance options and lets you choose which ones to run. During a maintenance sweep, the utility scans for viruses, although it doesn't continually keep an eye open for them in the background. It checks for multiple System files on the disk, which can cause Macs intermittent and unpredictable

problems. It marks bad dates for files (before 1970 or off in the future) and changes them to the current date. It checks for the attribute that allows file icons to display properly. And the program alerts you if you have more than a specified number of fragmented files or files you haven't backed up since they've been revised.

Safe & Sound doesn't back up or defragment your files, nor is it a proactive virus checker, one that intercepts a virus. Central Point Software advises you to buy other Central Point products if you want to back up files, defragment your hard drive, or run a vigilant antivirus program. Because these functions aren't as universally useful as the disk-repair functions, it makes sense for many people to do without them, but the stripped-down nature of the Safe & Sound utility set may be lacking for some users. In exchange for stone-cold simplicity, you have to trade off depth of features and exhaustive completeness.

Power users and people who want an all-in-one package should look at Central Point's MacTools or the recent Public Utilities from Fifth Generation, but for the vast majority of users, Safe & Sound's "less is more" philosophy makes sense, providing a compact, useful product that's easy to run and master, without the clutter of most bloated utility packages.

—JEFFREY GORDON ANGUS

Magneto-Optical Disk Drive

Infinity Optical 3.5

PROS: Compact removable media hold 120MB; medium is unaffected by stray magnetic fields; has external termination and SCSI-address switches; includes control panel for reading DOS-formatted cartridges. **CONS:** Costlier than other removable-media drives; slow performance when writing. **COMPANY:** Peripheral Land (510/657-2211). **REQUIRES:** Mac Plus; System 6.0.5. **LIST PRICE:** With one cartridge \$1999; additional cartridges \$70 each.



BLEND A FLOPPY DISK, A HARD DRIVE, and a compact disc, and what do you get? A magneto-optical (MO) drive such as PLI's Infinity Optical 3.5. MO drives combine the insert-and-eject convenience of floppy disks with the high capacity of a hard drive, and throw in the long-term durability of a compact disc. The result is a storage technology that's becoming increasingly popular for network file-serving and for backing up. MO drives are even gaining ground as primary storage devices for space-devouring documents such as scanned images and multimedia productions, although MO drives are slower and less pop-

ular than SyQuest and Bernoulli drives.

Where SyQuest and Iomega Bernoulli drives use a magnetic medium very similar to the medium used in conventional floppy disks and hard drives, the magneto-optical medium is a hybrid of magnetic and optical technologies. To write data, the drive heats the surface of the disk with a high-power laser; a magnetic field then orients ferrous particles embedded in the medium's surface to record a digital 1 or 0. To read data, the drive's laser switches to low power and a sensor reads light reflected from the particles (see "Optical Update," *Macworld*, November 1992). Unlike a hard drive or floppy disk, a magneto-optical disk is unaffected by stray magnetic fields. This extra reliability has helped make MO drives popular for archival backup applications.

PLI's Infinity Optical 3.5 MO drive sits beneath a compact Mac and uses a Sony mechanism and 3½-inch cartridges that store roughly 120MB of data. (An Epson mechanism is also available, for \$100 less than the Sony-based model.) A 3½-inch MO cartridge is about ¼ inch thicker than a floppy disk but otherwise looks very much like one, with the same write-protect tab in the corner and a similar metal shutter that protects the disk's surface. Slide the shutter aside, however, and you see the key difference: the MO cartridge has that same silvery gloss as a compact disc.

The Infinity 3.5 provides rear-panel SCSI-address and termination switches that eliminate the need for a SCSI terminator—a convenient touch. The drive also includes a control panel that enables you to transfer files from MO cartridges formatted on DOS machines. The DOS Transfer control panel does not enable DOS-formatted cartridges to appear on the Mac's desktop, however; for that, you need a utility such as Dayna Communications' DOS Mounter.

In Macworld Lab tests of 3½-inch drives, the Infinity 3.5 was among the fastest Sony-based machines, which were as a group slightly slower than 3½-inch MO drives built around a MOST mechanism. In the bigger picture, MO drives are generally slower than hard drives and SyQuest and Bernoulli drives but much faster than floppy drives, which use enhanced floppy disk technology to store 21MB per cartridge.

If you want removable media that perform as fast as a fixed hard drive, you should consider a SyQuest drive or one of Iomega's new Bernoulli MultiDisk 150 drives, whose cartridges hold 150MB. Both the Bernoulli MultiDisk 150 and PLI's SyQuest-based Infinity 88RWW44 retail for less than \$1000. But if you need the extra measure of permanence that magneto-optical storage provides—or you want a compact alternative to bulky cartridges—the Infinity 3.5 deserves a look.—JIM HEID

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Software Emulator

SoftPC with Windows

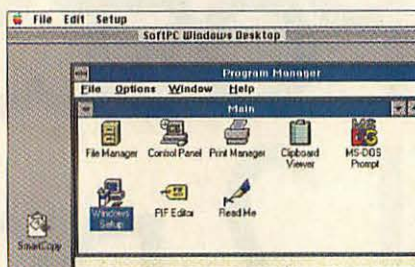
PROS: Preserves the tiniest Windows details; convenient Mac-managed Setup menu.
CONS: Slow; cumbersome installation.
COMPANY: Insignia Solutions (415/694-7600).
REQUIRES: Mac Quadra or other 68040 Mac; 8MB of RAM; hard drive; System 6.0.5. Recommended: 16MB of RAM.
LIST PRICE: \$499.



SOFTPC WITH WINDOWS IS AN AMAZING accomplishment. Insignia's original product, an emulator for DOS, carried out a much simpler task; DOS is a nongraphical operating system and makes minimal demands on computing resources. Windows, on the other hand, is the most egregious resource-hog ever to find widespread commercial acceptance, and producing a Windows emulator is a severely daunting programming challenge.

What you get is a window on the Mac desktop that behaves like a window on a 286-based AT-compatible PC with Windows 3.1 and DOS 5.0 installed (a 386 or 486 emulation would have been preferable, but one hasn't been done yet). The display

emulates CGA, EGA, or VGA, and can show 256 colors at maximum resolution, 1280 by 1024. With the addition of Insignia's \$149 SoftNode, this emulated PC also has Novell NetWare access, and the software includes Microsoft CD ROM driver software. It is just like having a Windows PC hiding inside your Macintosh—you can install any Windows-based program by following the original instructions, with no modifications or tricks. The installation of SoftPC with Windows itself is authentically as annoying as a real Windows installation; if you want to change the size of your C:\ hard drive (really just a file area on your Mac hard drive), you must slog through nine floppy disks, just as if you were changing a real piece of hardware. Other installation parameters, fortunately, can be



Strangely Unfamiliar You're looking at the most widely used graphical interface in the world—the one inside the SoftPC window.

changed through SoftPC's Setup menu, which rides above the Windows window.

The only difference between your emulated Windows PC and a 25MHz 386SX system (street price about \$900) is performance. Dreamlike languor is one way of characterizing the execution speed; scrolling a document in Microsoft Word for Windows makes one wonder about the performance of Charles Babbage's mechanical computer. Specifically, on a Quadra 950, SoftPC with Windows is about three to six times slower than on a 25MHz 386SX, with (for some reason) Microsoft's own programs running slower than anyone else's.

That observation, however, leads us to the actual point of the product. You'd have to be balmy to run Excel for Windows this way; any Mac program will outperform its Windows equivalent running on an emulator. The reason for SoftPC with Windows is access to Windows software developed in-house (accounting systems or customized databases, for example) or for specialized vertical markets. A Centris-plus-SoftPC system, for about \$3000, would give you a fast Mac and reliable, if slow, Windows capability—in short, access to most of the software worth using on the planet today. It's not cheap and it's not fast, but SoftPC with Windows is a reasonable solution to special software access problems.

—CHARLES SEITER

Hypermedia Publishing Program

Expanded Book Toolkit 1.0.1

PROS: Lets nonprogrammers produce sophisticated hypermedia books. **CONS:** Ability to customize basic templates is limited.
COMPANY: The Voyager Company (310/451-1383). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.7; HyperCard 2.1.
LIST PRICE: \$295.



PUBLISHING A BOOK IS HARD WORK. Producing a multimedia, hypertext book is a downright herculean labor, requiring programming, layout, and design skills, as well as lots of time and patience. Now, however, with Voyager's Expanded Book Toolkit, even average mortals can create functional, elegant multimedia books in a fraction of the time it would take to do the job unassisted.

Toolkit is essentially an interface that shields users from the nuts and bolts of HyperCard. To begin a new book, you select a template and then import text files. The Toolkit automatically creates new pages, flows the text, and handles such

chores as laying out chapter openers and producing a hyperlinked table of contents.

Forging your own multimedia links is a simple matter of highlighting text and then clicking on buttons in the annotation dialog boxes. Annotations can jump a reader from one page of your book to another, and they can also call up floating text boxes, pictures, recorded sounds, QuickTime movies, and other electronic books.

Toolkit books automatically contain all the functionality of Voyager's commercial Expanded Books. Features include word-search, excellent navigation tools, tools for marking text and making notes, and online help (see "The Complete Annotated Alice," *Reviews*, June 1992).

Various tools augment HyperCard's rudimentary text-handling functions and generally make an on-screen publisher's life livable. If you edit text after importing it, for example, Toolkit reflows the pages to fill in gaps. The Find functions let you define and search for widows and orphans, as well as search by font, text size, and text style. Keep and Revert give HyperCard a proper Undo function.

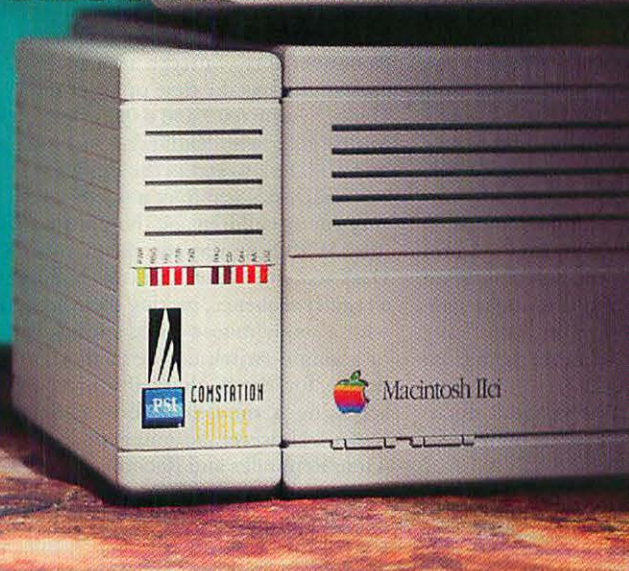
While Toolkit is a leap forward by HyperCard standards, desktop publishers should know that this is no QuarkXPress. Fundamental formatting functions such as tabs or justification are nonexistent, and many tools are primitive compared with

those of even a basic word processor. For example, block indents are created by a tool that adds carriage returns and spaces (another tool strips them out). And if you insert a new annotation, Toolkit won't go back and renumber the old ones.

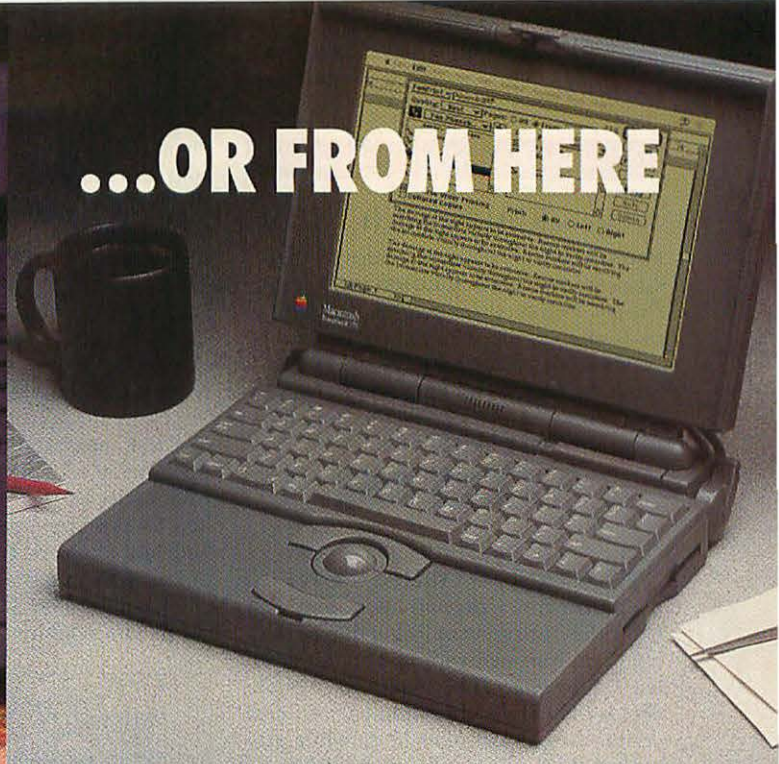
Another difference between HyperCard publishing and print publishing is that while anyone can alter a PageMaker template, only HyperCard aces should try to tinker with the Expanded Books' basic design. Expanded Books are one part document, one part finely tuned machine. While it's OK to swap fonts and add graphics, moving, say, to a two-column format could disable some or all of the book's features. A final surprise for some print publishers will be the small licensing fee Voyager charges for commercial projects.

All in all, however, Expanded Book Toolkit is an excellent program for teachers, documentation producers, and anyone interested in seeing what multimedia is all about. I wouldn't recommend it to people with absolutely no HyperCard experience—or no interest in gaining such experience. Multimedia is tricky by nature, and even Toolkit's friendly design and helpful manual can't produce a fail-safe environment. But if you're willing to thrash around a bit and can live within Toolkit's design limitations, this program can save you a lot of time and trouble.—JOE MATAZZONI

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COMstation TWO	PowerModem II	2400	9600
COMstation THREE	—	14.4	N/A
COMstation FOUR	PowerModem III	9600	9600
COMstation FIVE	PowerModem IV	14.4	14.4
COMstation Network	—	2400	9600



Circle 61 on reader service card

Desktop Environment for Children

KidDesk 1.0

PROS: Easy to use and set up; childproofs adults' data; good documentation. **CONS:** Under System 6, Kid's Documents and Time Reminder are disabled; scanning feature disables certain KidDesk accessories. **COMPANY:** Edmark Corporation (206/556-8484). **REQUIRES:** Mac Plus; 2MB of RAM for color; hard drive; System 6.0.7. **LIST PRICE:** \$39.95.



IF YOUR YOUNG CHILDREN LOVE TO experiment with your Mac, you may know the frustration of losing files or finding them renamed with mystifying labels like *hxbbsorujstkej*. That makes you a candidate for KidDesk, a desktop environment designed to appeal to children while protecting their parents' data from the havoc that curious little fingers can wreak.

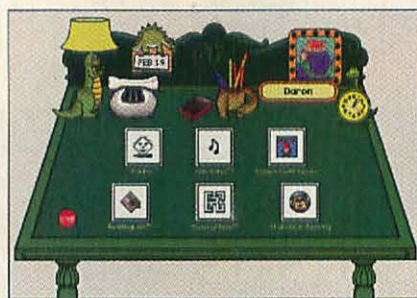
KidDesk replaces the Finder's desktop with one of six desks, each with nine accessories: Name Plate, Picture Frame, Lamp, Pencils and Pens (or Paints), Clock, Calculator, Calendar, Phone, and Recorder. On Macs equipped for sound input, you can record sounds and messages with the Recorder for your child to play back on the

Phone; otherwise, the Phone plays messages built into the program.

The Adult Section is where you add, remove, or customize desks. For each child's desk icon, you can choose one of the icons provided, create or modify one with KidDesk's icon-editing tools, or import a PICT file. You can also choose your child's exit option: shut down, quit to the Finder, or keep KidDesk running.

Normally, any application you add to KidDesk appears on all desks, but the Limit Applications feature lets you hide a program from a selected child's desk, making it inaccessible. You can also turn on and off any KidDesk accessory, and remove them from or return them to the desk.

Under System 7 KidDesk adds documents your children create to their indi-



Dinosaur Desk A custom Picture Frame icon and numerous applications personalize your child's desk.

vidual desktops. You can also add existing documents to a child's desk, and detach documents, making them inaccessible from KidDesk. Also under System 7, Time Reminder lets you type in a message to appear at a specific time or at set intervals. Under System 6.0.7 and 6.0.8, you can't use MultiFinder with KidDesk—and you must quit KidDesk to access the Finder.

KidDesk's scanning mode is useful for very young children and those with disabilities. With Scanning turned on, most KidDesk accessories automatically highlight in a regular sequence, making them accessible with a single mouse-click, a touch screen, or a single-switch device (a special input device for those physically incapable of accessing a mouse, keyboard, or touch screen). However, Scanning mode turns off Time Reminder and Recorder, and substitutes an abbreviated Calendar display.

Occasionally KidDesk did not open at start-up, leaving my files vulnerable. Edmark traced the problem to two antiviral utilities, SAM and Virus Checker (part of MacTools 2.0). It only happens with System 6 so you can either disable the offending utility or upgrade to System 7.

Cute accessories aside, KidDesk's main advantage is its practicality. It provides an easily navigable play environment for young children while safeguarding their parents' files and applications.—CATHY ABES

Hardware Diagnostic Tool

Peace of Mind 1.2.2

PROS: Performs exhaustive diagnostics and benchmarks; normal and power-user modes; good documentation. **CONS:** Provides no comparative test history; minor bugs. **COMPANY:** Polybus Systems Corporation (716/871-6533). **REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.5. **LIST PRICE:** \$149.



PEACE OF MIND IS A HANDY DIAGNOSTIC tool that runs exhaustive batch, interactive, and benchmark tests on virtually all major Mac hardware components, including RAM and ROM chips, monitors, internal and external hard drives, the CPU, sound chip and speaker, mouse, keyboard, floppy disk drives, printers, and serial ports.

Peace of Mind's normal, default mode has a simple icon-palette interface. The power-user mode's more flexible interface closely resembles the System 7 Finder's list view. The palette interface is straightforward and simple to use, but die-hard propper heads may be drawn to the wide array of test choices in power-user mode.

In the normal mode, two rows of buttons identify the tests available for your par-

ticular machine. (When you launch Peace of Mind, the program checks the hardware configuration and dims the buttons that are not applicable.) You can press a button to run only the tests for that component, or click on the Start button to sequentially run all the available tests. You can toggle between Quick Test, which takes about 5 minutes for all components, and All Tests, which takes approximately 45 minutes.

Peace of Mind displays a progress bar during each test, along with buttons that let you skip the current test or abort the test run completely. (Unfortunately, the skip and abort options are not available in power-user mode.) As each test is completed, a single status line reports the results. Complete test results are kept in a log window that you can display at any time or save to a text file for archiving.

Optional interactive tests let you check monitors for color, convergence, and linearity; the mouse for the accuracy of click and drag; keyboards for failing, stuck, or bouncing keys; and the speaker and sound chip for sound production.

You can also use Peace of Mind to perform extensive CPU, screen, and disk benchmarks, the results of which are presented in a convenient horizontal bar graph. Again, this information can be saved to a text file, but the program lacks a comparative test history feature, making compar-

isons between test runs a rather inconvenient manual chore.

In testing, all interactive tests worked fine on a Mac IIcx with an Apple 13-inch RGB monitor, but some screens were clipped on the bottom when displayed on the Classic's 9-inch monitor. Also, the interactive keyboard tests didn't work at all on the Classic; instead the program unexpectedly quit. Peace of Mind also intermittently had trouble remembering to run interactive tests on either the IIcx or the Classic unless the appropriate option was permanently set in the preferences.

On the other hand, I simulated several common hardware errors through various SCSI shenanigans (such as removing the terminator and assigning the identical SCSI ID number to two devices) and SIMM tweaking. Peace of Mind did an excellent job of diagnosing the problems. The manual really shines here, offering several possible solutions and recommendations.

Unlike Symantec's Norton Utilities, Peace of Mind is a tool you probably won't run regularly, since most hardware errors surface on their own in one way or another. However, it can help you narrow your search for a failing component, whether you perform your own hardware maintenance or just want to save needless diagnostic hours at your local repair shop.

—GARY KRATZER

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2108	698 MB	5.56 ms	10 ms	5 max	Yes
2112	1,050 MB	5.56 ms	10 ms	5 max	Yes

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Business Statistical Analysis

FASTAT 2.0

PROS: Carefully selected, carefully explained set of statistical tests; good assortment of graph types. **CONS:** Not significantly easier to use than SYSTAT; graph appearance needs work.

COMPANY: SYSTAT (708/864-5670).

REQUIRES: Mac Plus; 2MB of RAM; hard drive; System 6.0.2. **LIST PRICE:** \$495.



THE GIANT STATISTICAL ANALYSIS program SYSTAT is available in two smaller and less expensive forms. MYSTAT, a student disk-plus-textbook package, is limited to modest data sets but costs less than \$20. FASTAT, a program oriented toward professionals who are not statisticians, can handle real-world data sets (150 variables, unlimited number of cases).

The new version of FASTAT now includes the complete SYSTAT set of non-parametric statistical tests, stepwise regression capability, and some smoothing functions that represent a modest step in the direction of time-series analysis. There are also a few new standard business-chart types (pie charts and several types of bar charts), but from an analytic standpoint the most

important new feature is rotating 3-D graphics. For data sets of three to ten variables and a few hundred cases, the combination of 3-D plots and scatterplot matrices (SPLOM) is probably the most efficient way to look for relationships in data, so the addition of 3-D to FASTAT's already good SPLOM facility is important. To check your conclusions, you can invoke an automated multiple linear-regression option that includes most of the features of the full-scale option in SYSTAT. The procedures not included in FASTAT are cluster analysis, nonlinear regression, and advanced time-series analysis (Fourier and autoregressive methods). The selection basis for tests in SYSTAT versus FASTAT appears to be fairly straightforward; if it's a test you encountered in a one-year college statistics class, it's in FASTAT, and if it's a test from advanced statistics, it's in SYSTAT (along with all the basics). Particularly useful is FASTAT's somewhat simplified version of multiway table generation.

While the selection of statistical tests is quite generous, FASTAT needs some improvement in graphics. There are certainly enough graph types, including stem-and-leaf, box-and-whiskers, and Dit plots (and QuickTime movies of plots, for that matter)—the problem is that they require an unconscionable amount of labor to be rendered suitable for a real presentation.

The default fonts and axis formats make on-screen charts look like mainframe output from the late 1960s, and FASTAT's bias toward this austere look can be overcome only with tedious tinkering. The charts are in fact fine for scientific presentation, but times have changed in the world of business graphics. Someone at SYSTAT needs to spend a few hours with DeltaGraph Professional and see how things can be done.

FASTAT 2.0's manual is wonderful. Although it's just one volume, compared with four volumes for the full SYSTAT product, it actually provides more pages of explanation on key topics than does the larger set. In fact, the FASTAT manual is the best current reference for learning the SYSTAT command language (the new iconic interface for all SYSTAT products fails to conceal the company's undying love for batch execution of text-based commands). FASTAT is not actually any easier to use than SYSTAT; at least the manual makes it easier for beginners to get started.

FASTAT makes sense as the main day-to-day statistics tool for business or scientific users. It provides the statistical tests for most requirements, and its graph types convey plenty of information if not glamour. SYSTAT, Inc., has aimed this product right at the center of the statistical software market and made a solid hit on the target.

—CHARLES SEITER

Bar-Coding Software

MacBarcoda 2.24

PROS: Clean interface; EPS files are small; check-digit verification; professional version saves in EPS or Illustrator 1.1 format. **CONS:** Separate DA required for each type of bar code; cannot automatically create serial codes.

COMPANY: ComputaLabel (508/462-0993).

REQUIRES: Mac Plus. **LIST PRICE:** Three-code version \$349; single-code professional version \$495; six-code professional package \$895.



MACBARCODA IS A VERSATILE, EASY-to-use desk accessory that creates bar codes in either EPS or Adobe Illustrator 1.1 format. It has options for enlarging or truncating the bar code to fit and for correcting for the slight thickening that can occur in printing. The six-code package includes EAN, ITF-US, Code 39, UPC, ISSN, and ISBN. The company also sells codes individually and in a three-code package.

Creating bar codes with this program is extremely simple. Each installed type of bar code DA (many users will need only one) appears separately under the Apple menu (for System 6 users, that means using Font/DA Mover for each one). You begin

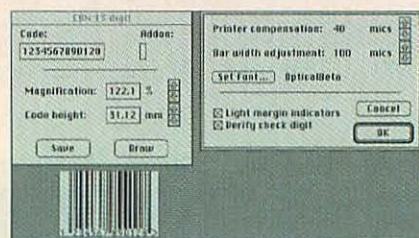
by choosing the code you want; say, EAN, a 13-digit numerical bar code used mainly in Europe for retail products. An EAN menu appears in the menu bar and a dialog box pops up for you to enter the numbers—a 2-digit country code, a 5-digit manufacturer number, a 5-digit product number, and a check digit based on the preceding 12 digits. If you enter an invalid check digit, an alert box lets you choose to cancel or have MacBarcoda automatically correct the invalid digit just this one time. If you paste in an incorrect check digit MacBarcoda will fix it, unlike Bar Code Pro from Synex. When you've entered all valid digits, you can click on the Draw button in the dialog box for a preview of your bar code.

You can use the arrow keys in the dialog box to scale the code in 5 percent increments or manually change the size. You can

also change the code's height by adjusting its values (in millimeters). ComputaLabel suggests you compensate for the thickening of the bars that can occur in printing, particularly if you print to film. You can make corrections, in 5-micron increments, through the Settings dialog box. I found figuring the compensation a bit confusing at first (there's a chart to help you out); but fear not, if you have trouble you can just send ComputaLabel sample output and the company will do the numbers for you.

After saving your bar code in either EPS or Illustrator 1.1 format, you're ready to import it into any application that supports those formats, such as Aldus PageMaker or QuarkXPress, for printing (you can't print directly from MacBarcoda). A nice feature is that MacBarcoda saves the file with a name made up of the type of bar code and the digits in that code. MacBarcoda cannot automatically create sequential bar codes; each code is a single file that, for convenience, you can save to a folder and import into your application.

ComputaLabel's technical support is good (although, strangely, the company's phone number is not listed anywhere in the manual). The manual needs to be updated to reflect System 7 (the program is compatible). Nevertheless, this compact, simple-to-use program gets the job done and does it well.—DANNY LEE



Making Adjustments For perfectly legible bar codes, MacBarcoda gives you precise printing and scaling controls.

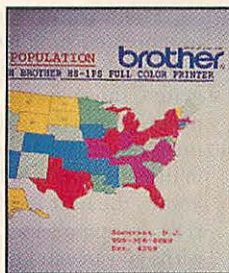
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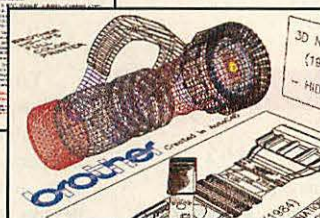
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Skill Game

Jewelbox 1.5

PROS: Well designed and executed; intuitive; nice music and colors. **CONS:** None. **COMPANY:** Varcon Systems (619/563-6700). **REQUIRES:** Mac II; 2MB of RAM; System 6.0.5 (6.0.7 for background music); 13-inch color monitor in 256-color mode. **LIST PRICE:** \$49.95.



IF YOU'RE PARTIAL TO GAMES THAT ARE easy to learn but take a lot of playing to master, and if you like the Tetris genre, you'll probably enjoy Jewelbox. Worthy successors to Tetris are rare; besides Super Tetris there haven't been any, in my opinion. Now Varcon Systems, maker of the elegant Arkanoid-type game Diamonds, has come up with a beautiful game that resembles Tetris quite a bit, but not too much. Jewelbox is a strong game on its own—an homage to Tetris, not just derivative.

Tetris players can probably jump in and start playing; others might want to spend a moment consulting the manual to see what's what. In about a minute you'll get the hang of it. The playing area (the jewelbox, natch) is a rectangle, and jewels fall

from the top in groups of three. The three jewels are always stacked vertically; your goal is to align and match individual jewel types (rather than fit together geometrical arrangements, as in Tetris). The J key moves the jewels left, L moves them right, and K rotates the stack vertically, so that what was the bottom jewel becomes the top.

Points are awarded for any row of three or more matching jewels—horizontal, vertical, or diagonal. When you make such a match, those jewels disappear and the remaining ones drop into their spaces. Sometimes this creates new matching rows, which in turn disappear. When you've matched 50 jewels, the next level starts, and the jewels start dropping faster. Every 100,000 points earns you an extra life. You start with three lives and three wild cards (you invoke wild cards with the I key); a life ends when the jewels reach the top of the jewelbox.

The jewels are topaz, diamond, ruby, citrine, emerald, amethyst, pink ice, and sapphire, all of which differ in shape as well as in color. Besides those eight, there are several kinds of special jewels (slightly reminiscent of Super Tetris's bombs and treasures): 1000-point black onyxes, wild cards, and others that add a life, speed up or slow down the falling jewels, and zap entire rows and columns.

Because you're lining things up rather than fitting them together (and making



Falling Rocks The Jewelbox display shows you which three jewels will drop next and keeps you informed of your score, the number of wild cards in your cache, how many lives you have left, and the level you're on.

diagonal lines takes some practice), the focus is different from that of Tetris. Jewelbox has one more big difference: the music. It's a pleasant, hypnotic, lulling yet perky MIDI-beat, and each time you create a matching row the little *plink* sound magically fits into the rhythm. The whole experience is quite relaxing. (Despite this, the usual warning applies: Don't play this or any game requiring repetitive motion for hours without taking frequent breaks.)

Jewelbox is a gem. I'm tempted to suggest a few more games that Varcon Systems might consider paying homage to.

—FELICITY O'MEARA

Arcade Game

Maelstrom 1.03

PROS: Fast; detailed animation; fun sound effects; user-configurable controls. **CONS:** Can't switch to other applications. **COMPANY:** Ambrosia (P.O. Box 23140, Rochester, NY 14692-3140). **REQUIRES:** 3MB of RAM; 12-inch or larger 8-bit-color or gray-scale monitor; System 6.0.7; Color QuickDraw. **LIST PRICE:** \$15 plus \$5 shipping and handling.



LOOSELY BASED ON ASTEROIDS, THE Atari classic, Maelstrom is a fast-paced arcade game featuring superb animation, hilarious sound effects, and exciting action. Best of all, this game is shareware, so you can try before you buy.

In Maelstrom, your spaceship is caught in an asteroid field. Your job is to destroy the asteroids and steer clear of collisions—basically to zoom around blasting things to smithereens. That sounds simple, but shooting a large asteroid causes it to break into smaller chunks, which in turn explode into still smaller pieces that streak off in every direction. If you so much as brush against the debris, your spaceship explodes in a fireball.

You play Maelstrom in waves. After each wave, you get a short break as bonus points are added. Extra ships are awarded at every 50,000 points. The early waves are easy, with just a few large asteroids. Successive waves are progressively more difficult, with more asteroids and other hazards.

You control your ship through the keyboard. With the configurable controls, you can rotate clockwise or counterclockwise, apply thrusters, engage the force shield, and shoot your plasma cannon. The controls are extremely responsive, so you can't blame your Mac when you buy the farm.

In addition to three sizes of asteroids, you must also avoid steel asteroids. These puppies usually ricochet off into space when shot, but occasionally they turn into insidious heat-seeking missiles that hunt you down unless you shoot them repeatedly. And be on the alert for enemy ships. When you're between a rock and a hard place, you don't need somebody shooting at you, too. Finally, keep your eyes open for novas and vortexes that materialize from nothing to send you spinning out of control.

All is not doom and gloom; good things also appear. To get comets (bonus points) and multipliers (which double, triple, quadruple, or quintuple your bonus points), shoot them before they disappear. But don't confuse them with stranded ships (extra lives) and supply canisters (items such as



The Maelstrom This frenetic arcade game requires quick reflexes and great hand-eye coordination as you search for asteroids, enemy ships, and other objects to blow to bits.

shield power, retrothrusters, luck, and cannon enhancements), which you collect by running over them with your ship.

Maelstrom has speed, colorful animation, rich sound effects, and enduring appeal. The artwork and animation were done by Ian Gilman and Mark W. Lewis under the guidance of programmer Andrew Welch, a photojournalism major at Rochester Institute of Technology.

If you obtain Maelstrom from a user group or online service, please honor the shareware system to encourage Andrew to write more great games. Or, if you prefer, send \$20 directly to Andrew Welch at Ambrosia.—OWEN W. LINZMAYER

How Butterflies Transform

The butterfly passes through several stages in its glorious transformation from egg to the completed creature that we all visualize as the butterfly. The adult female lays between one hundred and several thousand eggs throughout her lifetime each with the potential of becoming an adult butterfly itself.

Each egg, so tiny that it can only be seen by the human eye with the help of a microscope, is laid on or near a plant on which the newly hatched grub will be able to feed. These eggs are often green or yellow, but can also be found in shades of blue or red, each with a shell-like design covering it.

Usually in the spring or summer a tiny caterpillar, or grub, will hatch from the egg. This wormlike creature almost immediately begins to feed as it will consume the majority of its nutrients during this phase of its life.

The caterpillar will continue to eat until it has eaten so much that its skin can no longer contain the newly acquired mass. The skin then bursts and the caterpillar will shed it in order to have it replaced by a newer and larger one. This process continues for weeks as the caterpillar increases in size, several times its original mass.

Often during the time of fall, the caterpillar will then either spin a silken pad from which it suspends itself by its hind legs or it will fasten its body upright by silken threads to a twig creating a chrysalis or exposed pupa. Usually after spending the winter months dormant, the final stage of transformation will take place.

The shell of the chrysalis is broken open and the creature that emerges is barely recognizable as the butterfly that it will become. Its wings are crumpled and kept close to its moist limp body. It will remain clinging to the cocoon or a nearby branch as its form gradually begins to become dry and firm.

It moves its wings slowly at first with little strength but as they dry it is soon ready to take flight. The creature that ascends into the air has been through its final stage of development and is now the completed butterfly. This butterfly is now called the imago, or perfect insect.

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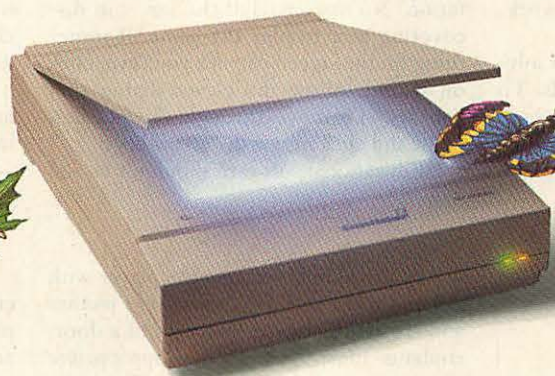


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Educational Adventure Game

The Secret Island of Dr. Quandary 1.0

PROS: Clever pictures and sounds; builds problem-solving skills. **CONS:** Slow; limited skill levels; no rewards. **COMPANY:** MECC (612/569-1500). **REQUIRES:** Mac Plus; 2MB of RAM and a SuperDrive for color; hard drive; System 6.0.7; 32-bit QuickDraw. **LIST PRICE:** \$49.95; teacher's edition \$69.



A CHILD COULD EASILY LOSE TRACK of time tooling through Dr. Quandary's mysterious island, gazing at the gorgeous landscapes and bebobbing to the catchy tunes that accompany each change of scenery. But then he or she would miss the chance to match wits with characters like Louis "Saxmo" Headstrong, William Ape-speare, and Dr. Q himself in arcade-game puzzles—all the while getting a good workout in reading, math, and logic skills.

Dr. Quandary focuses on problem solving rather than math or reading drills. To get off the island, you must first discover and then solve several puzzles, while acquiring the items you need to complete a recipe.

Some puzzles require you to build objects using templates and geometric shapes or to perform some tricky hand-eye maneuvers with the mouse or keyboard. In others you must identify mathematical factors. One has you figure out a combination lock aided by winks and grins from a man in shackles. If a puzzle becomes too frustrating, the Run Away command moves you to a different area. Alternatively, you can take a time-out or save the game and return to it later.

Dr. Quandary is intended for ages 8 to adult and has three levels of play (choose B. Ginner, O. D. Nary, or D. Feecult for your on-screen persona). Since only one person can play at a time and the vocabulary of the prompts and dialogs is quite sophisticated, Dr. Quandary is better suited to home use, where children can get one-on-one attention, rather than to a classroom.

The overall presentation is good. In 256 colors Dr. Quandary is a visual feast, but it works on monochrome Macs. On-screen prompts are clear and plentiful, and play is leisurely. A funny pamphlet and a Cheat Sheet are all you get for printed documentation. No matter. Half the fun is in discovering how to play the game. If something on the screen catches your eye, click on it and follow the clever dialog that appears. To move through the puzzles, point and click or use the arrow keys.

Educational software shouldn't be too



Standing at the Crossroads Players can match wits with the Bard of Secret Island, William Ape-speare; try the Tunnel Vision maze; or take a walk on one of Dr. Quandary's many lovely beaches.

flashy or it distracts from the learning process; nor should it be overly assertive—the player should be in control of the program, not the other way around. Dr. Quandary is good in this regard, integrating sight and sound so that they entertain without disrupting. However, all is not perfect. To allow players time to read the abundant dialogue, the action is slow, as are transitions from one puzzle to another (you can speed up play slightly by clicking on dialogue as it appears). And since it has only three levels—and no rewards—this game may lose its appeal sooner than some others.

That said, parents and their kids can have fun—and hone their logic skills—playing together on Dr. Quandary's island.

—JEFF GLORFELD

Reading Skills Game

Stickybear's Reading Room 2.2a

PROS: Bilingual (English/Spanish) operation; includes progress-assessment aids; easy to use. **CONS:** Weak user feedback. **COMPANY:** Optimum Resource (803/785-7441). **REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.7; hard drive. **LIST PRICE:** \$59.95.



SOME EDUCATIONAL PROGRAMS ENTICE the user with arcade-style action, so that learning becomes almost subliminal behind the game's entertaining munchers and crunchers. Stickybear's Reading Room takes a more sedate and direct approach to building primary-school-level reading skills.

Of Stickybear's four modules, Word Bop is closest to an arcade game. The left- and right-arrow keys and spacebar work a cannon that shoots at several pictures as they scroll across the screen. Hit the picture and its word replaces it. Shoot the word and the picture returns. Hit the picture again and it disappears. Word Bop has six levels of speed.

Word Match presents the player with either a word and six pictures or a picture and six words. Given a picture of a door, students must click on the appropriate word. Given an instruction—"Find the lion," for example—they must click on the correct picture.

Word Find presents three animated objects, an incomplete sentence, and a choice of three words with which to complete the sentence. For example, "Stickybear skips behind the _____" appears over an illustration of our host bear, a clown, and a tree; the word choices are *bulldozer*, *pig*, and *clown*.

Sentence Builder offers three subjects, three verb phrases, and three nouns from which to make a sentence. After you choose one of each, the program pronounces the sentence aloud and plays an animated sequence of, for example, "The penguin dances with the pumpkin." If the microphone option is on, students are asked to read the sentence out loud, and then hear themselves played back.

Stickybear's Reading Room is right on the mark for its target audience of children from four to eight years old. The activities are unhurried, with plenty of clear verbal instructions, enjoyable sound effects and music, and simple but engaging graphics. All four modules let you switch easily between English and Spanish.

The excellent user guide provides concise instructions, lists the nouns and verb phrases in the various activities (in English and Spanish), and suggests supplemental classroom activities.

Teachers and parents may also find the assessment tools helpful for monitoring students' progress. Word Match and Word Find can operate in test mode, recording scores on a report card that you can display on screen or print out (Word Bop automatically records on the report card). Sentence Builder stores and prints students' completed sentences.

A few areas still need improvement, particularly the user feedback. In Word Find and Word Match, you can choose every wrong option and each time be given the message "Try again." When you finally guess your way to the correct answer, the response is an enthusiastic "Great job!" With Sentence Builder's microphone option selected, you can read the sentence correctly or say nothing at all and still be complimented "Super job!" Also, only Word Bop offers students a number of skill levels. The other modules recycle their options interminably.

Early versions of Stickybear's Reading Room require 256 colors. The current version supports both color and monochrome systems, but it is much more appealing in color.—JEFF GLORFELD

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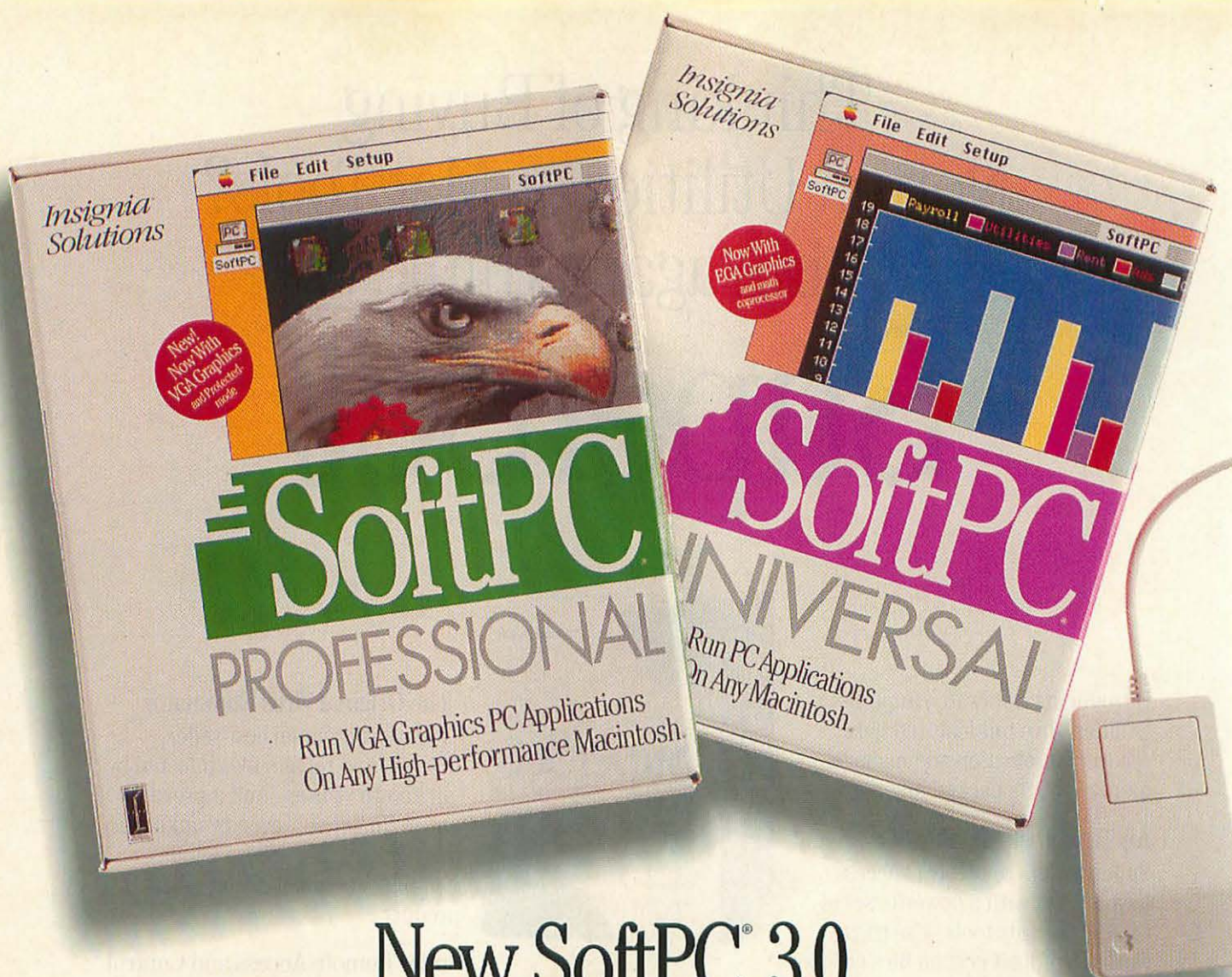
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Circle 72 on reader service card

The Printer in Seat 7A

BY DAVID POGUE

APPLE ENGINEERS SPENT sleepless months and countless dollars crowbarring a magnificent, 25-pound, high-horsepower Macintosh into a sleek, flat, 7-pound PowerBook. So they must go ballistic every time some layperson first lays eyes on the Mac laptop and says, "Neat. Does it print out?"

No, the Mac is not a memory typewriter. However, you can do pretty darned well in the way of portable printers. As a matter of fact, there are a bunch of battery-powered ones that go gorgeously with the PowerBook; you can perfectly plausibly perch on the plane, in passage to the shareholders' meeting, printing the last-minute pages of your big presentation (on, say, the importance of preparation).

Most of these printers were originally designed to accompany non-Mac laptops. That's why half of the following products are adapter kits that translate the Mac's printing instructions into a language these alien printers can understand. Note, too, that there's no such thing as a portable *PostScript* printer, so your dreams of rotated text and FreeHand package-design line art will have to go unfulfilled at least until Mannesmann Tally unveils the MobileWriter PS it's working on. But with Adobe Type Manager installed (\$7.50 from Adobe, or free with the WriteMove II, described below), your PowerBook can make these tray-tabletop printers do luscious things with text that's parallel to the ground.

Your Favorite Fax Modem

THIS ISN'T A PORTABLE PRINTER PER SE; it's not even a printer per se. It's more like a cheap trick per se. Instead of buying a printer, wait until you get to your hotel room. Then use your PowerBook's fax modem to fax your document to the hotel's front desk. You get your document on greasy, curly paper, but it's cheap and it works.

Kodak Diconix 701

BY TODAY'S STANDARDS, THIS BEIGE INK-jet printer (\$479, Eastman Kodak, 716/253-0740) gently tugs at the definition of *portable*; at almost 6 pounds (including the

rechargeable camcorder battery), it's like carrying a second PowerBook. With this thing dangling from one shoulder and a PowerBook from the other, you'll feel like gravity has doubled by the time you reach Concourse W.

Still, the Diconix 701 is, more so than its rivals, a genuine, full-strength printer. It spews ink droplets at 300 dots per inch—in theory, the same printout quality as a LaserWriter. (In practice, the minuscule droplets splatter some, as droplets are wont to do, so the 701's printouts aren't quite as terrific as a laser printer's; see "Portable Printouts.") Most important, the 701 is the only printer with a sheet feeder—a great one, at that; you can load the printer with 30 sheets of paper, set it down in your airplane seat, and it'll keep printing pages while you go to the restroom.

But in the world of miniature electronics, as PowerBook Duo owners know all too well, you traffic in trade-offs. And the price you pay for the 701's advantages isn't just weight and size, it's price: \$479 for the printer, and then \$79 or \$149 for an adapter kit. Frankly, if you can do without the battery operation, with only a couple fewer pairs of socks in your suitcase you could fit a certain *other* 6-pound, high-quality ink-jet that's quieter, faster, prettier, and less expensive: the Apple StyleWriter II.

Kodak Diconix 180si

AS PEOPLE ON DIETS WILL tell you, miniaturization has its price; you always give up some quality of life along with the size and weight. Take the Diconix 180si (Eastman Kodak again): at 3½ pounds (including the rechargeable NiCad batteries), it's certainly more portable than its big brother, the 701. But the 180si lacks two important features: the sheet feeder—you have to hand-feed one page at a time, or use pin-feed paper—and 108 of the 701's dots per inch (net dpi: 192). And believe me, you miss those 108 dots; see "Portable Printouts."

You have to insert, position, and lock down each sheet

of paper manually. Worse, you could *handwrite* your documents faster; a single-page, best-quality Word memo I printed took over four minutes to print.

So if the print is only ImageWriter quality, and it's slow as a slug, what's the sales pitch? In addition to this printer's sheer portability, there's the price: \$329, only about half as much as GCC Technologies' WriteMove II. (Of course, you still have to buy a \$39.95 adapter kit.)

GCC WriteMove II

AT FIRST GLANCE, POGUE'S THEORY OF Diminishing Features with Increasing Smallness is not clearly supported by the numbers associated with the WriteMove II, the most appallingly tiny printer you've ever seen (\$599, GCC Technologies, 617/275-5800). For example: 360 dots per inch; 2½ pounds, with battery; 2 inches square; 11½ inches long. The WriteMove II looks more like a hole punch than a business-quality printer. The rest of the good news: the printouts are incredible; the rich black film ribbon comes very close to creating laser quality. As a matter of fact, the WriteMove does remarkably well with fine gray shades; all the other printers and programs reviewed here either did a dismal dither or declined to do grays altogether.

If you ask me, the rest of the news and numbers aren't so good. (If you ask another *Macworld* reviewer, you'll get a different answer; see *Reviews, Macworld*, May 1993.) The battery only lasts for about 15 pages. The printer's price is a steepish \$599. And a ribbon only lasts for 25 pages! (There are two kinds of ribbon: a clothlike one that's good for about 80 pages, but produces washed-out, suitable-for-drafts-only printouts; and the high-quality, short-lived film ribbon. Both kinds are five for \$25.) The 6-inch cable to the PowerBook is too short, and loading the paper—one sheet at a time, of course—is awkward, since there's no flip-up paper support of any kind.

But the worst news of all *continues*



*A survey
of low-weight,
high-res
PowerBook
printer
paraphernalia*

is the WriteMove's speed. Are you lying down? It took five and a half minutes to print that 1-page Word memo, and an agonizing 8 minutes for a 1-page Excel spreadsheet with one graph. Yikes.

I get the point: this is a very, very portable printer for the sales rep or real estate agent who has to print out a 2-page contract in the client's living room. The printer is just too slow, and its battery/ribbon endurance too pitiful, for anyone else.

Kodak MPower

KODAK, MAKER OF THE TWO DICONIX printers, also makes an adapter kit for each: \$79 for the 701 model, and \$39.95 for the slimmer Diconix 180si. Each kit contains a Mac-to-Diconix cable, a software driver (a little icon you click on in the Chooser), and a manual. Both kits are hassle-free and work fine—except, as noted earlier, they're not so good at giving graceful grays. And you really do need Adobe Type Manager to get the most out of the Diconix devices.

If you're not used to thinking of Kodak as a Macintosh-product company, this additional point may sound absurd: Kodak's toll-free help line is far better than any other Macintosh-product company's. I've called it five times, both for technical questions and product info; every time, both kinds of questions were answered, technically and helpfully, *by the first person who picked up the phone*. No call-backs, no Muzak, no transferring to a sales representative. Have you ever heard of such a thing?

PowerPrint

THIS \$149 KIT FROM GDT SOFTWARES (604/291-9121, 800/663-6222) is like Kodak's MPower cable/disk packages, with one exception: instead of just making your PowerBook work with a particular Diconix printer, it makes your PowerBook work with 1000 IBM printers. The additional 999 printers aren't to be taken for granted; a number of other IBM-compatible portable printers—the Canon BJ 200 BubbleJet Printer, for example, or the

Portable Printouts

LaserWriter

Diconix 701

Diconix 180si

WriteMove II

Macworld
Macworld
Macworld
Macworld

Here, shown at twice the actual size, are the highest-quality printouts from three portable printers compared with a standard laser printer's output.

Printing Times

This graph shows the average speed of portable printers and software kits. The sample pages included a moderately formatted Microsoft Word document, a Microsoft Excel spreadsheet with a graph, and a simple Deneba Canvas graphic.

Times are in seconds per page. Shorter bars are better.

701 with PowerPrint	142
701 with MPower	165
701 with Grappler	206
180si with MPower	235
WriteMove II	343

Tests were conducted using a PowerBook 140 with 4MB of RAM and a 40MB hard drive.

microscopic Citizen PN48—suddenly become tempting printer possibilities if you find the trade-offs imposed by the Diconixes and WriteMove too great.

Frankly, I find it simply incredible that such a kit could even work. I would think the electronic and graphics architectures of the Mac and these alien printers would be just too different. But PowerPrint works wonderfully—and, relative to its Grappler rival described below, quickly. The kit actually provides only about 15 Chooser-selectable drivers; a booklet reveals that each one makes the Mac work

with dozens of IBM-universe printers, and tells you which driver to use for which printer.

Grappler IIsp

GRAPPLER IIsp IS ANOTHER cable/disk kit for making a Mac work with IBM-style printers (\$129, Orange Micro, 714/779-2772). It has three advantages over PowerPrint. It costs \$20 less, and it works by disguising every compatible IBM printer as an ImageWriter LQ, so that the Mac feels right at home. The biggest bonus: the software includes something called GrappleShare, so several networked Macs can use the same printer.

I didn't enjoy Grappler quite as much as PowerPrint, however, for two reasons. First, the setup is a little complicated, involving running an installer, selecting an icon in the Chooser, configuring a control panel, and restarting the Mac. Second—and this is the biggie—Grappler is about 45 percent slower than PowerPrint.

Both Grappler and PowerPrint worked fine for me with the Diconix 701. I also had good luck testing both kits with a couple of nonportable non-Mac printers. (Neither works with the smaller Diconix 180si, which requires a different kind of cable.) But unless you need the networking feature, let PowerPrint do your grappling.

Oh, and two postscripts. As this issue went to press Apple announced an IBM-printer adapter kit of its own, called the Apple Print Pack. Not only that, but GDT Softworks just announced a networkable \$399 version of PowerPrint. Sorry—I couldn't get either one in time to test.

The Upshot

IF YOU MUST TRAVEL WITH A BATTERY-driven printer, choose your favorite trade-off: (a) high-res and sheet-fed, but big and heavy; (b) compact and inexpensive, but low-res and slow; (c) tiny with gorgeous printing, but expensive and really, *really* slow. There you have 'em: the Diconix 701, Diconix 180si, and WriteMove II.

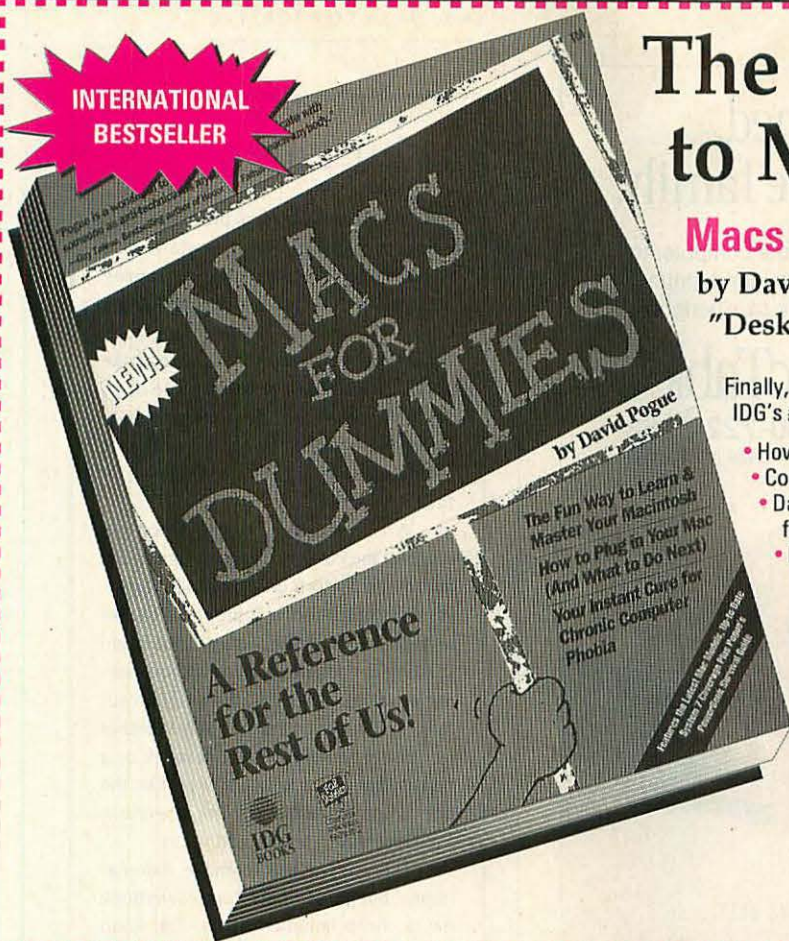
I encourage you to look at the following three alternatives, however. If your work on the road finds you sitting in one place for a while (like a week in a hotel room), a cheap, awesome-printing StyleWriter II will make you happier than any of the "portables." Also consider simply delaying printing (see "Print Later").

Finally, consider this concept: don't buy any portable printer. Instead, keep the *continues*

PORTABLE PRINTERS

	Diconix 180si	Diconix 701	WriteMove II
Company	Eastman Kodak	Eastman Kodak	GCC Technologies
Price	\$329	\$479	\$599
Dots per inch	192 (ink-jet)	300 (ink-jet)	360 (film ribbon)
Time it takes to recharge battery	10–14 hours (D-size NiCad batteries not included)	4.5 hours (MP55 camcorder battery not included)	6 hours
Battery charge life	50 minutes	50 minutes	32 minutes
Printer weight	3 lbs., 3.5 with battery	5.6 lbs., 5.9 with battery	2.5 lbs. with battery
Size	2 x 6.5 x 10.8	2.4 x 7.7 x 11.7	2 x 3 x 11.5
Cartridge life (best quality)	250 pages	400 pages	25 pages
Cartridge price	\$13.95	\$29.95	5 for \$25

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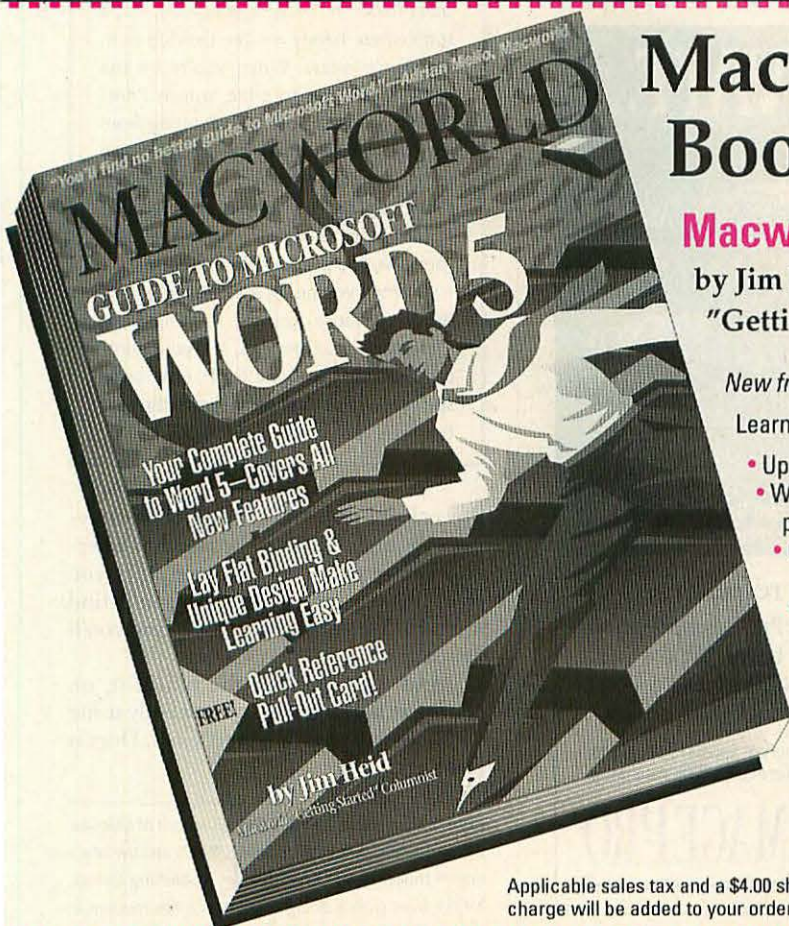
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Print Later

On The Road is a new program from Palomar Software (whose staff, one hopes, knows the rules of programming better than the rules about capitalizing a title; \$99, 619/721-7000). In any case, this program lets you make faxes or make printouts while you're in the plane or on the train, when you have no printer or phone line. These faxes and printouts get stored on your hard drive, waiting for their moment.

When you reach your destination and wake up the PowerBook, the program can automatically turn on AppleTalk (if necessary), switch to the appropriate printer in the Chooser (if necessary), and begin printing and faxing (with or without asking you first). Incredibly, the program automatically recognizes not only whether or not it's hooked up to a network or a printer, but *which* network or printer: the one at home, the one at work, the one in the New Haven office, and so on.

This isn't going to make Palomar happy, but guess what? Your PowerBook has a cheap imitation of On The Road built right in. Make an alias of your Print-Monitor icon (which lives in the Extensions folder in the System Folder). Put it somewhere handy: on the desktop or in the Apple menu. When you're on the plane and ready to print, launch Print-Monitor, and choose Stop Printing from the File menu. Nonsensical though it may seem, now start printing your documents! Obviously, nothing will actually print, but PrintMonitor will *spool* your printed files (preserve the printouts in disk form).

When you finally are hooked up to a printer, choose Resume Printing from PrintMonitor's File menu, and your printouts will start spewing forth. (The same spewing also occurs automatically the next time you turn on the PowerBook.)

PowerPrint disk and cable in your carrying case, and count on the fact that wherever you're going, in whatever office you visit, chances are good that you'll find some IBM-compatible printer. And you'll be ready.

And then, just for the fun of it, on your next flight, go up to somebody using a PC-clone laptop and say: "Cool. Does it print out?" **m**

Contributing editor DAVID POGUE, author of *Macs for Dummies* (IDG Books Worldwide, 1992) and the Macintosh thriller *Hard Drive* (Berkley Publishing Group, 1993), lives with a PowerBook and a fax modem in New York City.

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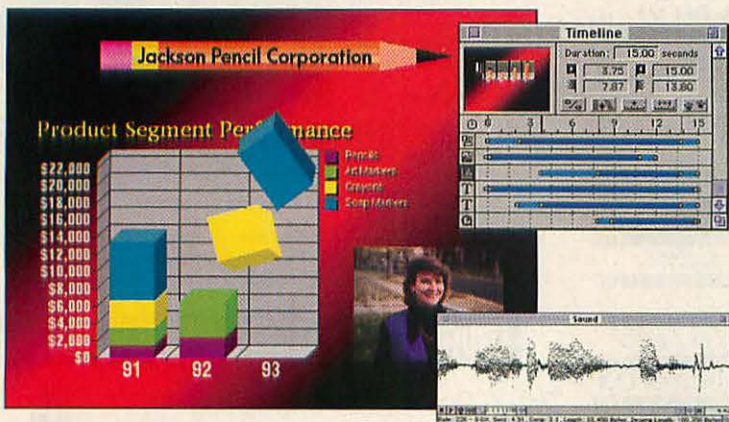
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HARDWARE

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This 1200-dpi plain-paper laser printer can handle paper sizes up to 11 by 17 inches. The printer uses a NuBus RISC controller board in the host Mac to cut font downloading and PostScript language interpretation time. The product is networkable and uses a Toshiba print engine. \$6995. LaserMaster Corp., 612/944-9330, 800/950-6868; fax 612/944-0522.

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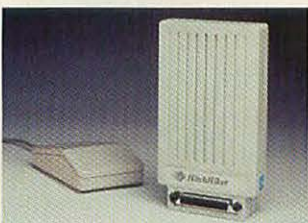
Digital video and animation recorder compresses digital images and animations and loads them into on-board RAM. From there, files can be recorded directly to videotape (at CCIR-601 video standard) or played to a monitor as full-frame, full-motion video (30 frames per second at 640 by 480 pixels). The product can also capture video in most major formats (including NTSC, PAL, and S-Video) via parallel and serial ports and save it in QuickTime format. The device connects to the Macintosh via SCSI port, and includes control software. \$5995. Fast Forward Video, 714/852-8404; fax 714/852-1226.

Czar

This NuBus, RISC-assisted processing board accelerates several applications, including Photoshop filters, 3-D rendering, and print rasterization. The board is built around the Silicon Graphics/MIPS R3000 RISC chip set and uses Torque Systems' Tuxex ComputeServer to handle task-passing. The board ships with a Photoshop unsharp mask filter. Other software is available, including the JAWS PostScript-compatible interpreter from Torque Systems, Computation's print-spooling software, Pixar's RenderMan, and a ray tracer for StrataVision 3D. 240MB SCSI hard drive required. \$5995. Integrated Device Technology, 408/988-5644, 800/345-7015; fax 408/988-5600.

DoveFax 144E, DoveFax Pro, DoveFax Pro+ Voice

Modular modems allow users to start small and add fax, data, and voice modules from Dove and third-party companies. All models are V.32bis and Group III compliant, and support V.32, V.42, V.42bis, and MNP Class 5. DoveFax 144E can send and receive fax and data at 14.4 Kbps. DoveFax Pro adds voice-answering capabilities, and DoveFax Pro+ Voice includes Dove's proprietary personal-answering-machine software. DoveFax 144E \$299; DoveFax Pro \$599; DoveFax Pro+ Voice \$749. Dove Computer, 919/343-5600, 800/849-3297; fax 919/251-9441.



HitchHiker 160

HitchHiker 160

Do good things come in small packages? Check out this 10-ounce, 160MB portable hard drive. The product uses a Quantum mechanism with an average seek time of 17ms, according to the company. The unit connects to the Mac via a 25-pin SCSI port (or to the PowerBook via an optional HDI adapter cable), and draws power from the ADB port. \$1099; PowerBook version (including HDI cable) \$1149. Mass Microsystems, 408/522-1200, 800/522-7979; fax 408/733-5499.

Kubik 240 CD ROM Changer

This CD ROM changer stores and feeds 240 discs into one or four Toshiba internal half-height drives (multisession Photo CD compatible). The changer plugs into the Mac serial port; drives plug into SCSI port. Package includes customizable control



Kubik 240 CD ROM Changer

and diagnostic software. Changer with four drives \$20,000. Kubik Technologies, 604/273-0400; fax 604/273-7237.

MacFG 24Xp

This 24-bit multiresolution graphics board plugs into a NuBus slot and can switch on-the-fly between three display modes. The product includes QuickDraw acceleration. Requires Mac II or higher. \$599. NEC Technologies, 708/860-9500, 800/388-8888; fax 708/860-5618.

MRD-80C

This removable drive can read from and write to 44MB and 88MB SyQuest cartridges. The product has average seek time of 20ms, according to the company; includes one formatted cartridge; and carries a two-year warranty. Formatting/partitioning and mounting software are included. \$985. Procom Technology, 714/852-1000, 800/800-8600; fax 714/852-1221.

PowerAccess

Two internal fax modems for Mac PowerBooks. The 96/96 sends and receives data and faxes at up to 9600 bps (V.32 compliant); the 144/144 sends and receives data and faxes at up to 14.4 Kbps (V.32bis compliant). Both units are V.42, V.42bis, and Group III compliant. Modems include specially modified QuickLink II software by Smith Micro. 96/96 \$299; 144/144 \$319. Dtronix, 408/982-9667, 800/995-1711; fax 408/982-9640.

Pressto

A NuBus compression accelerator board that speeds up JPEG compression and decompression within QuickTime-savvy applications. Product ships with Presstools software, which allows the user to open non-QuickTime JPEG files, as well as to view and compress other graphics files. \$795. Envisio, 612/628-6288; fax 612/633-1083.

Rand E

ET could turn on his Mac and phone home to this three-port stand-alone AppleTalk Remote Access server that allows Mac owners running System 7 to dial directly into an Ethernet network. Server ships in two versions: 10BaseT only, and 10BaseT, thin Ethernet, and thick Ethernet. Product includes management software; modem not included. 10BaseT \$1299; 10BaseT, thin and thick Ethernet \$1399. Focus Enhancements, 617/938-8088, 800/538-8866; fax 617/938-7741.



ScanMate 5000

ScanMate 5000

For hard-core graphics users only. This 5000-dpi (true resolution), single-pass, color drum scanner can handle transmissive or reflective originals in dimensions ranging from 35mm by 35mm to 9 by 12 inches. The unit connects to the Mac via SCSI port, and ships with an Adobe Photoshop plug-in. ColorQuartet scanning, separation, and color-management software available. \$45,000; ColorQuartet software \$1685. ScanView, 415/378-6360; fax 415/378-6368.

Sony Monitors

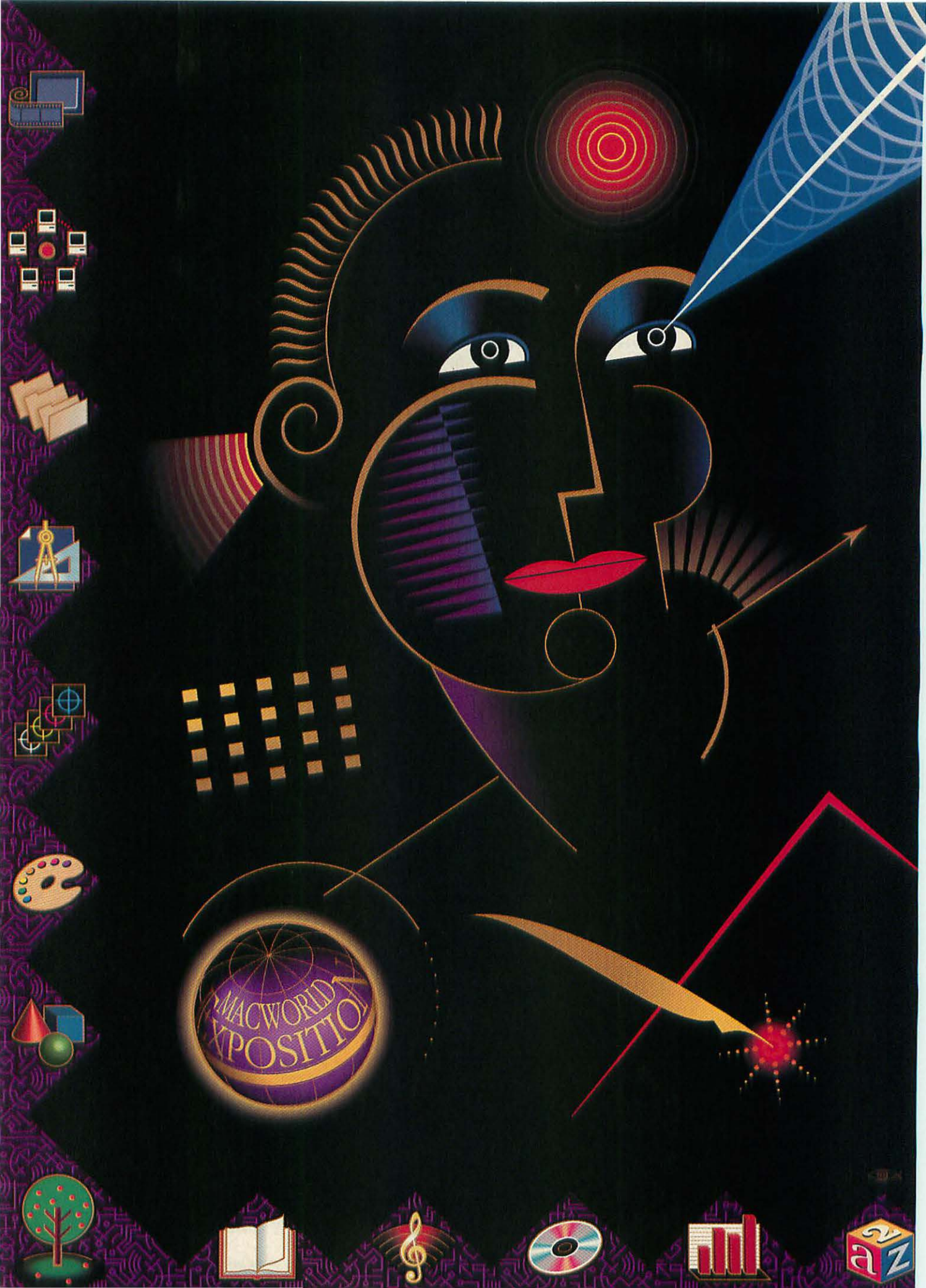
Three new Trinitron monitors from the land o' sushi. The CPD-1430 and CPD-1730 have 14- and 17-inch diagonal measurements, respectively. Both have a refresh rate of 72Hz, 1024-by-768-pixel resolution, and a 0.25mm aperture pitch. The GDM-2038 has a 20-inch diagonal measurement, an 80Hz refresh rate, 1280-by-1024-pixel resolution, 0.30mm aperture pitch, and controls that allow the user to set the color temperature. All three monitors have digital image controls and meet the Swedish MPR II guidelines for VLF and ELF emissions. Adapter required. CPD-1430 \$1029.95; CPD-1730 \$1759.95; GDM-2038 \$3795.95; adapter \$19.95. Sony Computer Peripheral Company, 201/368-3774, 800/352-7669; no fax.



Video-MUX 8x4

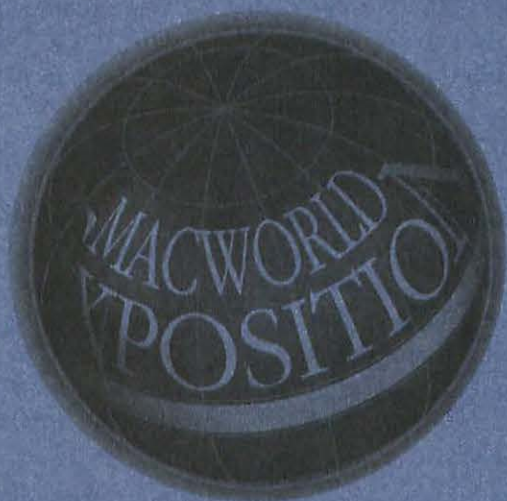
Video-MUX 8x4

Like a video traffic cop, this video router allows software-based switching of up to eight video sources and up to four video outputs (RS-170 black-and-white or NTSC color). The unit plugs into the continues



DECISIONS ARE

EASIER



ONCE

YOU SEE IT ALL FROM HERE.

MACWORLD EXPOSITION BOSTON

TUESDAY AUGUST 3 - FRIDAY AUGUST 6, 1993.

SPEND A LITTLE TIME IN THE FUTURE



You know what you want. You know where you're going.

But what's the best way to get there? How can your Macintosh platform help you achieve your goals?

As the global source for Macintosh information, MACWORLD Expo is

your single, best resource to

get answers to these questions and more. With over 400 exhibiting companies presenting the very latest in Macintosh technology, MACWORLD Expo shows how you can get from "here" to "there." At MACWORLD Expo you can: Decide whether it's better to upgrade your system or buy new. See which model is best for you. Decide if you should buy now or buy later. Take a look at what's new in software. See what's out there to increase your productivity. And preview what will hit the market soon.

DECISIONS ARE EASY AT MACWORLD EXPO

MACWORLD Expo offers you the opportunity to make side-by-side comparisons of thousands of Macintosh hardware, software, peripheral and service products. And with an army of Macintosh professionals on hand to answer your questions, decision-making is easy at MACWORLD Expo.

MACWORLD Expo shows you new ways to turn your vision into reality. A visit to MACWORLD Expo is like spending a little time in the future.

MACWORLD EXPO/BOSTON 1993 AUGUST 3 - AUGUST 6

MACWORLD Expo/Boston 1993 will cover 300,000 square feet of exhibit space at Boston's World Trade Center and Bayside Exposition Center. When you come to MACWORLD Expo/Boston, you'll see uses and applications for the Mac in areas that include: Networking, Spreadsheet Analysis, Databases, Education, Research, Word Processing, Accounting, Law, CAD/CAM, Forecasting, Design, Publishing, Illustration, Animation, Music, Programming, Entertainment and Multimedia. With so much to see, this decision is easy: plan to be in Boston from August 3 - August 6 to see the Macintosh at its absolute best!

PREREGISTRATION SAVINGS ARE AVAILABLE NOW

Now is the time to preregister for MACWORLD Expo/Boston! When you return the attached preregistration form with your payment by June 25, you'll save \$30 on all Conference Sessions* and Exhibits (\$100 now vs. \$130 at the door), or \$10 on Exhibits-only admission (\$20 now vs. \$30 cash only at the door). Preregistration not only saves you money, it also saves you time. When you preregister, we send your admission badge early so you can walk right into MACWORLD Expo and get a jump on the thousands of people expected!

SPECIAL EXPO OFFER: 6 ISSUES OF MACWORLD MAGAZINE

Your registration fee for MACWORLD Expo/Boston includes a six-issue subscription to *Macworld Magazine*. To receive your six issues, simply fill out the Special Expo Card at the Macworld booth during the show. Your first issue of *Macworld Magazine* will be mailed to you soon after the conclusion of MACWORLD Expo.

A CLEAR VIEW OF TOMORROW

The Conference Program

As your computer capabilities grow stronger, more powerful, and more sophisticated, your Macintosh is rising to the occasion. But you need to know more. You need to get an overview of what Mac technology can do today, and you need to know how you can slash costs, increase productivity, maximize your efforts, and even have fun in the process. You also need to know what the future will be for Macintosh computing. What's new and exciting in Macintosh technology? What's in store for tomorrow? What new directions is Apple taking and how will you be affected?

The MACWORLD Expo Conference Program takes a close look at all these issues and delivers answers you'll love to hear. You'll learn exactly how much you can achieve with your Macintosh now, and what's on the horizon. The Conference faculty offers you a clear view of tomorrow in 15 complete conference programs with over 140 individual sessions. MACWORLD Expo's one-price conference admission policy lets you create your own customized agenda. Spend as much time as you'd like at any or all of these conference sessions.

1. The Design Conference. Pushing the desktop envelope. Electronic prepress expertise. Professional color input/output. 3-D modeling and rendering. Interactive publishing. Digital photography. Creative imaging. Dramatic breakthroughs in hardware and software for the graphic design and production community.

2. The Enterprise Computing Conference.

Tools and technologies currently available (and coming soon) to address the thorniest development issues facing IS departments, including client/server, cross-platform, GUI, object-oriented design, and more.

3. The Programmer/Developer Conference.

The hottest breakthroughs and innovations, plus: scripting savvy; the latest on IAC, AppleEvents, OCE; database engine technology; XTND technology; transitions from mainframes to Macs; making your application QuickTime-literate.

4. The How-to-Get-Started Conference. Complete guidelines for those who are brand-new to the Mac, or need a concentrated lesson on popular Mac applications, including desktop publishing, databases, accounting, HyperCard, telecommunications, programming, design and QuickTime.

5. The Advanced User Conference. Experienced users share their expertise and insider's tricks for getting more mileage out of the PowerBook, desktop publishing, System 7's power user features, customizing your Mac, resolving system conflicts, and hot new ideas.

6. The Connectivity Conference. Users and vendors alike share insights on cross-platform databases, client/server technology, moving data between multiple platforms, troubleshooting LocalTalk problems, long-distance connectivity, Mac/DOS integration, and more.

7. The Science/Technology Conference. Stellar applications of the Macintosh in laboratory and scientific settings, plus user feedback and industry updates on the Mac's role as a significant computing platform.

8. The Home Office/Small Business

Conference. Hardware and software especially designed to save you time and money, low-cost and

no-cost programs and procedures, users' favorite utilities and shortcuts, and disaster-avoidance strategies.

9. The Entertainment Conference. Bridging the gap between Hollywood and the East Coast with QuickTime, professional video, digital audio, broadcast-quality graphics, animation, MIDI, and more.

10. The Special Interest Group Conference. For "birds of a feather" looking to compare Mac notes with others in a similar setting — to solve special problems, to see how colleagues across the country are getting more mileage out of the Mac, and to develop an invaluable "user network." Here you'll find sessions on the Mac in the law office, the Mac in health care, the Mac in real estate, and the Mac for Senior Citizens!

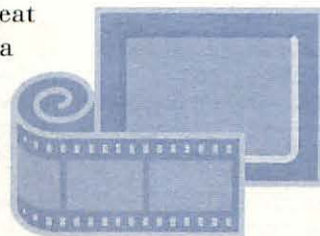
11. The You-Asked-for-It Conference. Fact-filled sessions covering the latest market developments and emerging technologies, and responding to your special requests — including the perennial favorite MUSE (MACWORLD Expo User Group Extravaganza).

12. The Education Conference. Sixteen education-specific sessions make this the world's largest and most information-rich collection of Macintosh topics designed especially for K-12 and university educators!

13. Application Workshops. Intensive training sessions — each a minimum of 80 minutes in length — on some of the most popular Macintosh applications, as taught by the award-winning staff of MacAcademy. Topics include Microsoft Word, Claris FileMaker Pro, Microsoft Excel, Aldus PageMaker, and more.

14. New Horizons Conference. To examine some of the many new directions the Mac is taking, along with its tremendous range of new enabling technologies.

15. The Multimedia Conference. The demand for multimedia sessions at MACWORLD Expo has grown so great that we've developed a full two-day twenty-session program to accommodate all the multimedia topics you've been requesting — and more!



PREREGISTER FOR MACWORLD EXPO/BOSTON BY JUNE 25 AND SAVE \$10 TO \$30

The largest Macintosh event in the world will be in Boston from Tuesday, August 3 through Friday, August 6, 1993 at the Bayside Expo Center and the World Trade Center. And when you preregister by June 25, you'll save time and money.

Please choose your package and fill out the form completely. Incomplete forms will be returned. **One form per person; make photocopies for additional people.** Please do not staple check to form. Registration forms received after June 25, will be returned unprocessed. **PURCHASE ORDERS CANNOT BE ACCEPTED. ALL REGISTRATION FEES ARE NONREFUNDABLE.**

Send completed forms to:

MACWORLD Expo/Boston
P.O. Box 4010
Dedham, MA 02027

U.S. Attendees: Badges will be mailed on or about July 19. Be sure to check box indicating where badge should be sent.

International Attendees (including Canadian): Badges will be held for pick-up at the Non-U.S. Preregistration counter at Bayside Expo Center beginning Monday, August 2. For Federal Express service, check the appropriate box below and add \$45 to your preregistration fee. Fill in your exact street address (no P.O. boxes) and include your telephone number and country code. We will Federal Express your badge directly to you.

SPECIAL EXPO OFFER

6 Issues of MACWORLD Magazine:

Your registration fee to MACWORLD Expo/Boston will include a six-issue subscription to *Macworld Magazine*. To receive your six issues, simply fill out the Special Expo Card at one of the Macworld booths during the show. Your first issue of *Macworld Magazine* will be mailed to you soon after the conclusion of MACWORLD Expo.

Please register me for:

☐ Package One \$100

Conference sessions* and exhibits. Preregister by June 25 (\$130 at the door).

☐ Package Two \$20

Admission to exhibits only. Preregister by June 25 (\$30 cash only at the door).

☐ Check if applicable. I'm an International attendee and would like my badge shipped by Federal Express. Enclosed is an additional \$45.

Please send my registration badge and further information to:

Please check one: ☐ Home Address ☐ Company Address

First Name _____ Last Name _____

Street Address _____

City _____ State _____ Zip _____

Country (Other than U.S.) _____ Telephone _____

If mailing to company address:

Title _____

Company _____

☐ Check enclosed (make payable to MACWORLD Exposition) Amount \$ _____

☐ Master Card ☐ Visa ☐ American Express Amount \$ _____

Account Number _____

Expiration Date (include all numbers) _____

Card Holder Signature (Signature necessary to be valid) _____

If card holder is other than registrant, please print cardholder's name below:

First Name _____ Last Name _____

After June 25, you must register at the show.

Please check the appropriate information:

Your industry or profession

- 01. ☐ Advertising
- 02. ☐ Arts/Entertainment
- 03. ☐ Business
- 04. ☐ Communications/Publishing
- 05. ☐ Consultant
- 06. ☐ Distributor/Dealer/Retailer/Service
- 07. ☐ Engineering
- 08. ☐ Government
- 09. ☐ Health Services
- 10. ☐ Higher Education
- 11. ☐ Information Services
- 12. ☐ K-12 Education
- 13. ☐ Legal Services
- 14. ☐ Manufacturer (computer industry)

- 15. ☐ Manufacturer (non-computer)
- 16. ☐ Other (specify) _____

Your title

- 17. ☐ CEO/President/VP
- 18. ☐ DP/MIS Manager
- 19. ☐ Manager/Department Head
- 20. ☐ Network Manager
- 21. ☐ Programmer/Analyst
- 22. ☐ Engineer/R & D
- 23. ☐ Consultant
- 24. ☐ Marketing/Sales
- 25. ☐ Educator
- 26. ☐ Art Director/Graphics
- 27. ☐ Editor/Writer
- 28. ☐ R & D

- 29. ☐ Student
- 30. ☐ Other (specify) _____

Size of your organization (number of employees national and international)

- 31. ☐ Under 50
- 32. ☐ 50-99
- 33. ☐ 100-499
- 34. ☐ 500-999
- 35. ☐ 1,000-5,000
- 36. ☐ Over 5,000

Which personal computer(s) do you own/use?

- 37. ☐ Macintosh (128K, 512K(E))
- 38. ☐ Macintosh Plus

- 39. ☐ Macintosh Classic/Classic II

- 40. ☐ Macintosh LC
- 41. ☐ Macintosh SE/SE 30
- 42. ☐ Macintosh II/Hx
- 43. ☐ Macintosh II si
- 44. ☐ Macintosh II cx/ci
- 45. ☐ Macintosh II fx
- 46. ☐ Macintosh Quadra Series
- 47. ☐ Macintosh Portable/PowerBook Series
- 48. ☐ Apple II Series
- 49. ☐ IBM PC (or compatible)
- 50. ☐ None
- 51. ☐ Other (specify) _____

- 52. Which hotel are you staying at? _____

*MACWORLD Expo conference sessions are on a first-come, first-served basis with no guaranteed seating and are subject to change without notice. All registration fees are nonrefundable. Do not staple check to form. Send completed form, with check or money order to: MACWORLD Expo, P.O. Box 4010, Dedham, MA 02027.

CHOOSE THE WAY TO COMPLETE YOUR STAY

MACWORLD Expo/Boston, Tuesday, August 3 - Friday, August 6, 1993
at The World Trade Center and Bayside Exposition Center

Show Hours

August 3-5: 10 a.m. - 6 p.m.

August 6: 10 a.m. - 3 p.m.

Conference Hours

August 3-5: 10:30 a.m. - 5:30 p.m.

August 6: 10:30 a.m. - 2:30 p.m.

Deciding to go isn't the only easy part about MACWORLD Expo/Boston 1993. We're pleased to offer a complete package of discounts and amenities that also make MACWORLD Expo/Boston decidedly easy to attend:

Fly American Airlines and Save. Receive savings on applicable fares when you fly American Airlines to MACWORLD Expo/Boston. As the official airline of MACWORLD Expo, American is offering additional discounts of 5-10% on most fares. To see if American can work for you, dial 1-800-433-1790 and ask for Star File # S-1083AL.

Savings on applicable fares only.

Car Rental Discounts From Hertz. If you're planning to rent a car, you'll get a great rate from Hertz. Call 1-800-654-2240, ask for Convention #11197, and tell the reservations operator you're attending MACWORLD Expo.

Early Bird Registration. If you miss the preregistration deadline on June 25, you can still register before the start of the show! On-site Early Bird Registration is from 11 a.m. - 3 p.m. on August 2, at the full registration rates of \$130 for all Conference Sessions* and Exhibits, and \$30 (cash at the door) for Exhibits-only admission.

Services for the Physically Challenged. Services are available to help make the MACWORLD Expo experience more enjoyable for the physically challenged. Call us at 1-800-945-3313 for details.

Prerecorded Information. To listen to prerecorded information about MACWORLD Expo/Boston 1993, call the Information Hotline at 617-361-3941 (24 hours a day, seven days a week). We'll see you in Boston!

Participating hotels in the Boston area are offering MACWORLD Expo discounts. To receive the preferred rates, simply call one of the hotels listed and mention you're going to MACWORLD Expo. There's a limited number of rooms available at preferred rates, and they sell out rapidly. *Please make your reservation by June 30 for the best selections. If you are reserving ten or more rooms, you must supply the hotel with the first night's non-refundable deposit and a rooming list no later than June 15.*

Legend:

Published hotel rates are starting rates

All hotel phone numbers are in the 617 area code. Rooms are priced for single and double occupancy.

MACWORLD Expo will be providing service from Copley Square and Boston Common locations.

(C) Hotel within walking distance of Copley Square shuttle location.

(B) Hotel within walking distance of Boston Common shuttle location.

(H) Hotel is providing its own shuttle service to MACWORLD Expo (check with hotel directly for specifics).

Hotels

Sheraton Boston Hotel & Towers (C)

236-2000; \$155/\$170

Boston Park Plaza Hotel & Towers (B/C)

426-2000; \$131/\$151

Boston Marriott Copley (C)

236-5800; \$169/\$169

Marriott Long Wharf

227-0800; \$225/\$245

Westin Copley (C)

262-9600; \$187/\$208

Omni Parker House (B)

227-8600; \$145/\$165

Back Bay Hilton (C)

236-1100; \$155/\$175

Tremont House (B)

426-1400; \$105/\$120

Hyatt Regency Cambridge (H)

(Cambridge)

492-1234; \$165/\$185

Sheraton Tara Braintree (H)

(Braintree)

848-0600; \$109/\$109

Colonnade (C)

424-7000; \$150/\$170

57 Park Plaza (B)

482-1800; \$115/\$125

Harborside Hyatt (H)

568-1234; \$165/\$185

Swissotel Boston (Lafayette) (B)

451-2600; \$135/\$155

Howard Johnson Southeast (H)

288-3030; \$75/\$85

Holiday Inn

Government Center (B)

742-7630; \$146/\$162

Holiday Inn Randolph (H)

(Randolph)

961-1000; \$90/\$90

Copley Plaza (C)

267-5300; \$175/\$195

Four Seasons (B)

338-4400; \$226/\$247

Guest Quarters Suites (H)

(Cambridge)

783-0090; \$150/\$170

Ritz Carlton (B/C)

536-5700; \$205/\$215

Lenox Hotel (C)

536-5300; \$147/\$167

The Meridien Hotel (B)

451-1900; \$205/\$205

Hilton at Dedham Place (H)

(Dedham)

329-7900; \$125/\$125

Royal Sonesta

491-3600; \$145/\$145

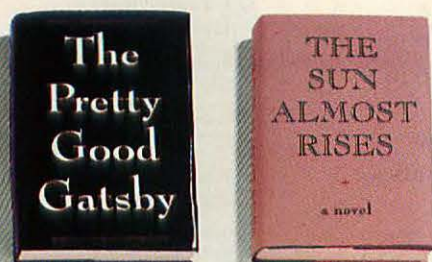
Logan Airport Hilton

569-9300; \$140/\$160

*MACWORLD Expo Conference sessions are on a first-come, first-served basis with no guaranteed seating, and are subject to change.

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BOOKS THAT NEVER REACHED THEIR FULL POTENTIAL.

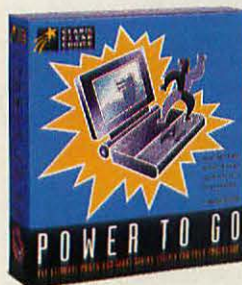


(Your PowerBook without Power To Go.)

To prevent a potential tragedy like this from happening to your PowerBook, pick up a copy of Power To Go.™ The new utility program from

Claris Clear Choice.™

It will stretch your battery life, increase your hard drive space with file compression, provide security for your files and save your screen. There's even a quick airport security check function.



With Power To Go, you can customize your PowerBook, so it will work like you do.

And at just \$69*, it's never been easier for your PowerBook to live up to its name.



INTRODUCING POWER TO GO

Call 1-800-544-8554 or visit your Claris® dealer. Power To Go comes with a 30 day money back guarantee.

© 1993 Claris Corporation. All rights reserved. Offer valid in U.S. only until 9/30/93. * Dealer price may vary. Claris Clear Choice and Power To Go are trademarks of Claris Corporation. SOURCE CODE 194.

Mac serial port and includes controller software. Up to 16 devices can be daisy-chained to one Mac. Requires NuBus-equipped Mac II or Quadra. \$1295. Computer Modules, 408/496-1881; fax 408/496-1886.

SOFTWARE

ArroGlyphs: Environment 1

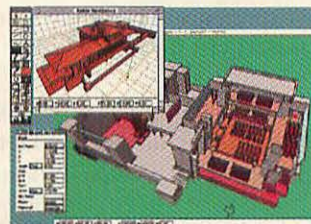
Product consists of 200 black-and-white EPS images illustrating environmental issues such as recycling, pollution, and the future of life on our planet. Images range in complexity from small clips to detailed illustrations. \$199.99. Arro International, 201/746-9620; fax 201/509-0728.

Cumulus

Networkable image-file archiving and indexing software featuring client-server architecture and automatic indexing by thumbnail, file name, resolution, size, color depth, and other criteria. Users can also add keywords, comments, and status information. 2MB min. memory; System 7 required. \$295. Canto Software, 415/431-6871, 800/332-2686; fax 415/861-6827.

DesignWorkshop

3-D CAD software features crosshairs extending from x, y, and z planes; editable Object Info box; dynamic view adjustment with an eye tool; and click-and-drag creation of openings in solid objects. User can also create QuickTime walk-throughs and time-lapse sun studies. 2.5MB min. memory, math coprocessor required. \$895. Artifice, 503/345-7421; fax 503/346-3626.



DesignWorkshop

DQ-Mac232

This product is a software-only video controller for frame-accurate animation recording and digitizing. This product can control RS-232-compatible laser-disc recorders, as well as the Sony EVO-9650 Hi-8 video deck. The package includes Photoshop plug-ins, XObjects for Macromedia products, and Animaq software for handling other Mac file formats and animation applications. Sequential-frame digitizing and alpha-channel compositing available as Digicomp option. 4MB min. memory. \$995; Digicomp option \$695. Diaquest, 510/526-7167; fax 510/526-7073.

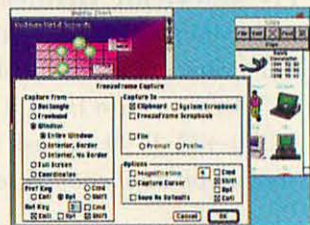
Education LabPack

Hey, kids, let's put on a show! This product provides hands-on instruction in video production, and includes editing software; videotape source footage from a professionally produced TV show, news program, feature film, music video, and commercial; assignments and exercises

on CD ROM; and a faculty guidebook. 8MB min. memory; System 7 required. \$2995. Digital F/X, 415/961-2800, 800/955-8273; fax 415/961-6990.

Explode

This package features drawing tools and a parts library intended to ease the creation of exploded view illustrations. User can draw objects using familiar tools, or simply choose such standard hardware components as bolts, nuts, washers, and gears from an object library. Object parameters can be adjusted to user specifications. Objects can then be placed with a single mouse-click. 1MB min. memory. \$1000. Airo Design & Manufacturing, 414/284-7169; no fax.



FreezeFrame

FreezeFrame

An MTV video? No, a graphics utility that lets users read, write, convert, view, and print graphics files in several different formats. The package also features a screen-capture capability and image catalog and retrieval. 1MB min. memory. \$89.95. DeltaPoint, 408/648-4000, 800/367-4334; fax 408/648-4020.

FutureBASIC

BASIC editor/compiler can create stand-alone applications and code resources. Features an in-line assembler; local and global variables; direct access to Toolbox functions, procedures, and data structures; and a source-level debugger. System 7-compatible; supports 32-bit addressing, virtual memory, Apple events, and QuickTime. 1MB min. memory. \$299.95. Zedcor, 602/881-8101, 800/482-4567; fax 602/881-1841.

IO

Calling Dr. Science, your control panel has arrived. This product enables the user to import serial data into Mac applications from most densitometers, colorimeters, and spectrophotometers, as well as other scientific-measurement serial devices. The package includes Densitometer Mac, a stand-alone serial capture program. 1MB min. memory. \$299. Fifth Wave, 408/248-9306; no fax.

Kappa

Software properly capitalizes text in the Clipboard. Product includes editable exception lists so that proper nouns, acronyms, and prepositions and articles in titles are capitalized correctly. 1MB min. memory; System 7 or System 6.X with MultiFinder required. \$69. Skidmark Software, 714/543-5592; no fax.

Kudo Image Browser

Cataloging, browsing, and retrieval software for still- or motion-image files that scans selected folders or volumes and creates a thumbnail catalog of qualified

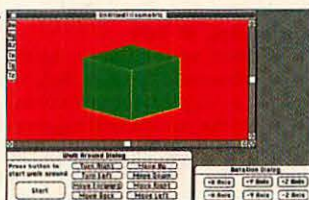
files. Users can search by file attributes or other predefined criteria, or scan thumbnails at up to 10 per second with the Riffle command. 4MB min. memory. \$295. Imspace Systems, 619/272-2600, 800/494-4555; fax 619/272-4292.

LogoVista E to J

Budding United Nations employees, take note. This product can translate a wide variety of English-language ASCII-text material into Japanese. The system dictionary contains 80,000 entries and can be supplemented with optional technical dictionaries and customized user dictionaries. Product features alternative translation choices and formality levels of Japanese output. 8MB min. memory. \$1995. Language Engineering Corp., 617/489-4000; fax 617/489-3850.

MacSpotter

Information manager for automated dialogue recording. Allows sound editors to print out cue lists, sorted by character or time, for dialogue recording. Scenes can be moved between reels; time can be displayed in feet, frames, or SMPTE time code; and printed lists can be customized. 1MB min. memory. \$495. BKMS, 510/232-2567; no fax.



MacWireFrame

MacWireFrame

This development tool allows the user to create custom 3-D solid and wire-frame modeling software. The product includes Pascal source-code library of object types and graphic routines and a ready-to-run example application program. The product also includes a fully functional 3-D modeling application that supports hidden-line removal, shaded surfaces, real-time navigation around and through objects, and publish and subscribe. 2MB min. memory; math coprocessor and color monitor required. \$399.95. Amplified Intelligence, 916/737-1550; fax 916/454-9350.

Metrics

Application converts between systems and units of measurement. Includes conversions for area, length, liquid, recipe (for example, pinch, teaspoon, tablespoon), temperature, speed, troy weight, U.S. weight, and volume. Most major units of both U.S. and metric systems are represented. 1MB min. memory. \$79. ESI, 407/242-0140; fax 407/253-3538.

NetScrap

NetScrap organizes and provides access to Mac files across a network. Users can search for files by name, description, keyword, date, and several other criteria. Supports Communications Toolbox for access via ADSP, ISDN, TCP, and X.25 protocols and for remote queries via modem. Product creates a pointer to preview and thumbnail images stored on

a server. 4MB min. memory. Three users \$295; unlimited users \$995. Everyware Development Corp., 416/819-1173; fax 416/819-1172.

On The Air

"Dr. Johnson, your travel agent is calling on line five." Now, your AppleTalk network can double as an intercom system. On The Air can sample sounds from any microphone-equipped Mac, transmit them across an AppleTalk network, and play them once received. Users can also send other format sounds (AIFF, snd, and SoundEdit). The product also provides a call-blocking feature for a few moments of much-needed quiet. 2MB min. memory; System 7 required. 1 package (2 users) \$79.99; 5 to 12 packages \$64.99 each; 13 to 24 packages \$49.99 each; 25 or more packages \$39.99 each or negotiable site license. Digital Eclipse Software, 510/547-6101, 800/289-3374; fax 510/547-6104.

On the Road

Soothing relief for several PowerBook/network problems. The product defers printing or faxing output until the PowerBook is connected to the proper device or phone line. It also remembers AppleShare volumes for several locations and can automatically enable and disable AppleTalk (to save battery power) based on the presence or absence of a network. 2MB min. memory; System 7 required. \$99. Palomar Software, 619/721-7000; fax 619/721-4758.

PixelPlay

It's show time! This screen saver plays QuickTime movies and ships with ten skiing, snowboarding, and windsurfing clips. The product includes an After Dark module and the Apple QuickTime extension. 4MB min. memory. \$49.95. Silicon Sports, 415/327-7900, 800/243-2972; fax 415/327-7962.



PixelPlay

Stellar 7

This venerable game made its debut in 1983 on the Apple II, and now it's available for the Mac, updated with a new graphics engine, digitized story sequences, and new sound effects and music. Players must pilot the tanklike Raven fighting machine through hordes of vicious aliens to save Earth from Gir Draxon, Supreme Overlord of the evil Arcturan Empire. 2MB min. memory. \$34.95. Dynamix, 503/343-0772; fax 503/344-1754.

Story Club

Welcome to the high-tech reading corner. This product presents 15 folktales via videodiscs, CD ROMs, audiocassettes, books, and lesson guides. The separate



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components of the system reinforce common language structures and concepts. Kids hear the stories read aloud, explore interactive versions of the stories on CD ROM, and write and illustrate their own stories. Requires 2MB min. memory, Mac II series or higher, 1MB hard drive space, and MacDAC with MacRecorder or Mac microphone. Starts at \$4000; includes eight hours of on-site training and network installation if required. Davidson & Associates, 310/793-0600, 800/545-7677; fax 310/793-0601.

TeleFinder

It's back. Now capable of managing up to 32,000 users, this multiline bulletin board system includes a graphical user interface, electronic mail, conferencing, and ZModem file transfers. The multi-server architecture allows users to run separate BBS nodes on networked Macs. Options are available for AppleTalk-based BBS and FidoNet access. 2MB min. memory; System 7 required. \$425. Spider Island Software, 714/669-9260; fax 714/669-1383.

TrueType Master Set

Bill Gates's team hits the Mac font market with this package of 102 TrueType fonts. The package includes 35 PostScript equivalents (for example, Bookman, New Century Schoolbook, Times, Courier), fonts from the Lucida family, and 45 display faces. This set of fonts matches all Microsoft TrueType fonts for Windows, enhancing cross-platform document compatibility. \$99.95. Microsoft

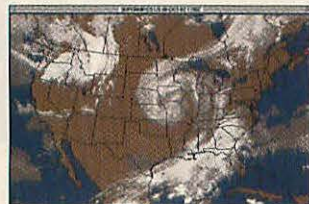
Corp., 206/882-8080, 800/426-9400; fax 206/883-8101.

UPCTools

This collection of Type 1 PostScript fonts and utilities creates UPC version A, UPS version E, Bookland, ISBN, ISSN, EAN-8, and EAN-13 bar codes. The user can create full-height and truncated symbols, with and without bar-width reduction to compensate for ink spread gain on the press. Symbols can also be scaled and rotated. Adobe Type Manager 2.X required. \$149. Azalea Software, 206/937-5919; fax 206/937-5919.

Weathermac

The more it blows, the more it goes on snowing—this package lets users track Pooh's storm, as well as any other weather patterns that come along. With a subscription to the WSI database, the user can download and view radar pictures of storms moving across the country, worldwide satellite images, and up-to-the-minute National Weather Service forecasts and advisories. 1MB min. memory. Weathermac \$495; subscrip-



Weathermac

tions start at \$90/hour. WSI, 508/670-5000; fax 508/670-5100.



Zoo Keeper

Zoo Keeper

As zookeeper for a day at Zoo World, children must take care of the zoo and keep all the animals healthy and happy by learning and adjusting for animal habits and habitats. The product features photos and sounds of 50 different animals, courtesy of *Zoo Life* magazine and the TV show "Zoo Life with Jack Hanna." 4MB min. memory; color monitor required. \$59.95. Davidson & Associates, 310/793-0600, 800/545-7677; fax 310/793-0601.

CD ROMS

The Adventures of Pinocchio

Pinocchio comes to life (so to speak) in this 270-page talking storybook. The book is divided into 20 chapters with full-color illustrations on every page, reading-comprehension questions for each chapter, and plenty of sound and ani-

mation within freely explorable "living pages." 2MB min. memory; color monitor required. \$69. Orange Cherry New Media, 914/764-4104, 800/672-6002; fax 914/764-0104.

Dictionary of the Living World

Sharks gotta swim and bats gotta fly, snakes gotta slither, and you'll find out why with this multimedia encyclopedia of life on Earth. Product includes biological terms and articles for over 5000 species, and hundreds of pictures and QuickTime video clips. Software includes an Editor that allows users to assemble specific information and access it quickly by clicking on a custom icon. 4MB min. memory; QuickTime clips require a hard drive. \$149.95. Compton's NewMedia, 619/929-2500; fax 619/929-2600.

Multimedia Space Encyclopedia

A wealth of information for students of the final frontier. Product includes a time line of space exploration, hundreds of images and QuickTime movies, biographical notes on space pioneers, overviews of missions and launch vehicles, information on the space shuttle, and more. 2MB min. memory. \$129.95. BetaCorp Technologies, 416/564-2424; fax 416/564-6655.

Rock, Rap, 'N' Roll

Do you have what it takes to be the next jukebox hero? The Rock, Rap, 'N' Roll Song-A-Lizer takes prerecorded song loops that you select and sequences them into a song. Next you can add

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instrumentals, vocals, and sound effects using the mouse, keyboard, Mac microphone, or any other sound-input device. The Magic Mixer automatically mixes the tracks; the resulting sessions can be saved to disk. 4MB min. memory. \$59.95. Macworld CD Ventures, 415/267-1778, 800/821-1177; fax 415/543-3984.

ACCESSORIES

AC Power Pack

Part one of a two-part unit features a lead acid battery rated for 3 amp hours at 12 volts and a cigarette-lighter socket. Part two, an inverter module, slides on and provides 120V AC outlet. Unit recharges in four to six hours using the included 120V AC charger. DC cord for charging from car battery via cigarette lighter also included. Unit weighs 3 pounds and features a built-in regulator that prevents overcharging. \$175. Innova Electronics, 714/241-6800, 800/795-4124; fax 714/432-7910.

MacFly Joystick

If you feel the need for speed, this Mac joystick might fill the bill. The product plugs into a serial port but behaves just like an ADB joystick. The joystick automatically relinquishes cursor control when user moves the mouse. The included control panel software adjusts for different screen sizes and resolutions. \$79.95. Izu Products, 409/824-3332; fax 409/824-3303.

MasterPiece Compact

Surges and spikes begone! This power control center sports four outlets, four switches (including one master switch), a 15-amp circuit breaker, electromagnetic and radio-frequency interference filters, and an antistatic button that safely grounds static charges when touched. Five-year warranty covers product replacement/repair costs as well as up to \$20,000 toward current market value of damaged equipment. \$99.95. Kensington Microware, 415/572-2700, 800/535-4242; fax 415/572-9675.

NB 4400

Hard-side travel case for notebook computers. Product features precut foam bed with optionally removable sections for a custom fit, an 11-by-14-inch compartment for papers and manuals, and smaller compartments for disks and spare batteries. Two smaller cases are aimed at PowerBook users: the NB 3400 lacks an extra paper compartment, and the NB



NB 4400

1000S holds PowerBook only—no accessories. NB 4400 \$179.95, NB 3400 \$149.95, NB 1000S \$69.95. Doublecase, 719/531-5535, 800/475-0707; fax 719/594-9331.

BOOKS

Cool Mac Games Plus

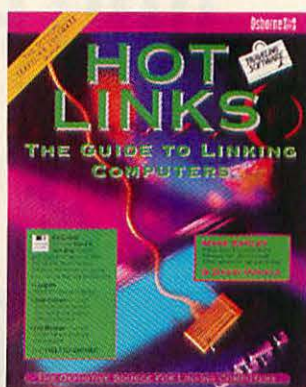
The perfect gift for the antiproduktivity maven. The book includes tips, tricks, and hints on many popular games as well as sources for Mac games and musings on the state of the Mac game market. Product ships with two 1.44MB floppy disks of compressed shareware. Written by yours truly, Cameron Crotty. 144 pages. \$24.95. Hayden Books, 317/573-2500, 800/428-5331; fax 317/573-2583.

Help! The Mac Answer Book

Everyone wants a security blanket, especially when the computer gremlins strike. This book guides readers through troubleshooting basic Macintosh glitches and hang-ups, and tells how to recognize larger problems that may need a dealer's attention. Written by Steven Schwartz. 200 pages. \$14.95. Alpha Books, 317/573-2500, 800/428-5331; fax 317/573-2583.

Hot Links: The Guide to Linking Computers

To some people, *connectivity* isn't just another overused buzzword. This book begins with the basics of ports, cables, and connectors and builds up to local



Hot Links: The Guide to Linking Computers

area networks and alternatives, modems and online services, laptop computers, cellular phones, and more. Written by Mark Eppley and David Hakala. 254 pages. \$29.95. Osborne/McGraw-Hill, 415/549-6600, 800/227-0900; fax 415/549-6603. **m**

To have your product considered for inclusion in *New Products*, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, *Macworld*, 501 Second St., San Francisco, CA 94107. *Macworld* reserves the right to edit all product announcements.

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* Some software may not be updated to work properly with Motorola's 68040.

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TECHWORKS



Circle 131 on reader service card

Questions and Tips from Macworld Readers

BY LON POOLE

YOU CAN MAKE PERSISTENT changes to the Page Setup dialog box of any LaserWriter with PostScript. Use ResEdit, Apple's resource-editing utility, to duplicate the LaserWriter file's PREC 1 resource, and then change the duplicate's ID to 0, as described in January's *Quick Tips*. George Berendes of Blainville, Quebec, found one vital act missing from the end of step 1 in that description: after changing Page Setup settings in any application, you must print with those settings. Only then are your settings written to the PREC 1 resource in the LaserWriter file. Incidentally, these settings apply to new documents created by most applications, but not all. Notable exceptions include Microsoft Word and the Finder. Also, this procedure may not work with other printers.

No More Magic

THE MAGIC WORD DOESN'T WORK WITH HyperCard Player 2.1, the version of HyperCard that's been included with all models of new Macs since fall 1992. That is, you can't make the authoring and scripting levels available by going to the Preferences card of your Home stack, displaying the message box, typing the command **magic**, and pressing the return key. Several readers read about this procedure in the *Letters* section (February 1993) and were puzzled when it didn't work. They even tried typing **set userlevel to 5** in the message box, as described in *Quick Tips* (November 1992), to no avail.

The HyperCard Player sets the user level to 3 (Painting), so you can edit text in unlocked fields, add new cards, and use the HyperCard paint tools. If you want to set the user level to 4 (Authoring) or 5 (Scripting) so you can add new fields, add new buttons, create new stacks, or write scripts, you'll have to buy Claris's \$199 HyperCard Development Kit. Owners of HyperCard versions 1.25 and earlier can upgrade to the latest version of the Development Kit for \$99; the upgrade is free for owners of HyperCard 2.0 (call Claris at 800/544-8554). The upgrade includes the

same disks as the complete development kit but has fewer manuals. (Apple has announced that it will take over development of future versions of HyperCard, but that Claris will sell and support the current version until the next one is released.)

Centering Inside Windows

Q. When I open a WordPerfect 2.1 document, I must click the right horizontal scroll arrow twice to center the text of that document inside the document window, that is, to get equal white space to the left and right of the text. How can I change the default positioning of text within the document window?

Also, is there any way to create a Things to Do item in the Apple menu, which would open my to-do list saved as a WordPerfect document?

Albert Hsia

Somerville, Massachusetts

A. If you expand the window to show the entire width of the page (for example, by clicking the zoom box at the upper right corner), you will see all of the left and right margins of an 8½-inch-wide page. If you then save the document, WordPerfect remembers the new window size, and when you reopen the document you will again see the entire width of the page, including left and right margins.

This procedure won't work if the monitor is too narrow to show the entire width of the document, as would always be the case on a Mac Classic's screen. To center the text of a WordPerfect document in a window that's narrower than the document, you can use macro utility software such as QuicKeys² (from CE Software, 515/224-1995 or 800/523-7638). You could, for example, create a macro that clicks the right scroll arrow twice. WordPerfect has its own macro capability, but in my experience, it hasn't been able to change horizontal scroll bar settings.

And yes, if you're using any version of System 7 you can add documents, applications, folders, and other items such as control panels, sounds, and fonts to the Apple menu by dragging their icons—or better yet, aliases of their icons—to the Apple Menu Items folder, which is inside the System Folder.

Technical-Information Sources

Q. I found your October 1992 article, "Your Computer Revealed: Inside the Processor," very informative. Do you know of any additional technical information on the Motorola 68040 processor and the Mac Quadras? I am particularly interested in features such as register and program counter configuration, interrupt lines, cache, and so on. [As described in the article, a register is quick-access, scratch-pad memory inside the microprocessor. The program counter is a register that tracks where to find the next instruction the microprocessor must execute. The cache memory inside a microprocessor stores recently executed instructions and data to expedite their reuse.—L.P.]

Jean Aiken

New Ipswich, New Hampshire



Creating
silhouettes in
Photoshop,
applying
colorless icon
labels,
and more

A. Motorola publishes hefty handbooks for its microprocessors, such as *68040 Microprocessor User's Manual* (Motorola publication number MC68040UM/AD; \$2.45) and *68030 Microprocessor User's Manual* (Motorola publication number MC68030UM/AD; \$3.50). In addition, the *68000 Family User's Manual* (Motorola publication number M68000FR/AD; \$5.40) contains the most important facts about each of the processors in the 68000 family, including the 68040, 68030, 68020, and 68000 models used in Macintosh computers. You can order these books by calling Motorola's Literature Distribution Center at 602/994-6561.

continues

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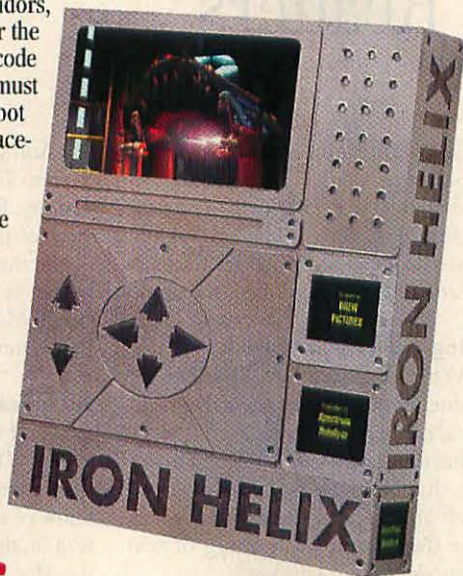
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You'll find technical information about the Quadras in Apple's *Macintosh Classic II*, *Macintosh PowerBook Family*, and *Quadra Family Developer Notes* (APDA part number R0143LL/A; \$25). Other developer notes cover other Macintosh computers and LaserWriter printers introduced since October 1990.

The complete set of developer notes, together with a great deal more technical information, is available on CD ROMs produced monthly by the Apple Developer Group (of which APDA is a part). The APDA Technical Information Mailing (APDA part number C0197LL/A; \$250) includes a 12-month subscription to the Developer CD ROM series and more. For much less money you can get the latest Developer CD ROM once each quarter as part of a subscription to Apple's quarterly technical journal, *develop* (APDA part number M0929LL/A; \$27).

To request an APDA catalog or order a product, call 800/282-2732 in the United States, 800/637-0029 in Canada, or 716/871-6555 from other countries.

Ciphering RTF

Q. We use 4th Dimension for data management and WriteNow for word processing. Because we need formatted data listings in our word processed reports, I have programmed several procedures in 4th Dimension that format the data as a text file in RTF format. We can then open the RTF file with WriteNow to create a formatted document with all the proper ruler settings, font sizes, and styles. This saves us from manually formatting text in WriteNow, and promotes consistency, since there may be hundreds of lines of data that need to be set up exactly the same way.

I've been able to figure out many elements of the RTF format by looking at RTF files created by WriteNow, and my procedures work well, but I would like to know more about the RTF format so that I can solve a few problems and add more features. Is there a specification for the RTF format available, and if so, who publishes it, and how can it be obtained?

*Gian Carlo Cervone
Rochester, New York*

A. Microsoft originated the RTF format, and publishes a complete RTF specification. Contact Microsoft Developer Service Team, RF1, Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6393, 800/227-4679.

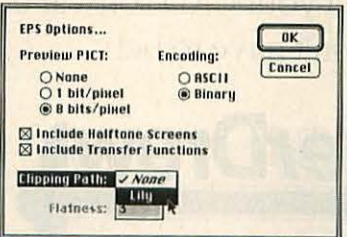
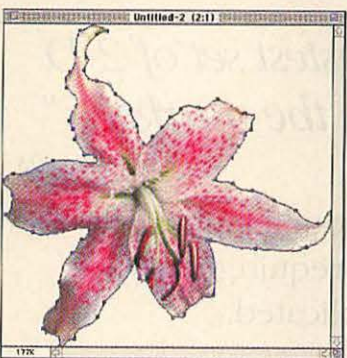
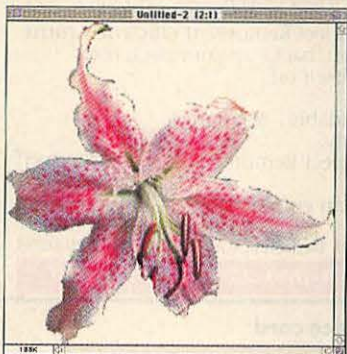
After Dark Randomizer

TIP If you use the Randomizer module in that great productivity tool After Dark, you can have your favorite

Profiling with Photoshop

How do you silhouette, or isolate, part of a photograph with Photoshop? Edna Mintz of Hollywood, Florida, wants to know, and she is especially interested in the kind of silhouetting used in catalog pictures. Here's one method that works with most images, developed with the help of Macworld senior designer Arne Hurty.

1. Select the part of the picture you want to isolate. Use the lasso to trace just inside the edges of the part of the picture you want to isolate, and then use the Grow command in the Select menu to enlarge the selection. As needed, manually add to the selection by pressing the shift key while using the lasso, and manually subtract from the selection by pressing ⌘ while using the lasso. Making these adjustments may be easier if you zoom in 2:1 or more. Selecting with the magic wand instead of the lasso can be faster when you're isolating something of fairly uniform color against a contrasting background. You may also want to experiment with isolating part of an image using alpha channels as described in the tutorial manual that comes with Photoshop.
2. Copy the selection, create a new Photoshop document, and paste the selection into it. To remove the unnatural-looking fringe from the edges of the selection, choose Defringe from the Select menu and enter the width of the fringe in pixels; then click OK. If you're not sure of the fringe width, try values between 1 and 6. Use the Hide Edges command to temporarily hide the shimmering selection line and see the effect of the Defringe command, and use Undo if you want to try a different fringe width.
3. After removing undesirable fringe, choose Make Path from the Select menu. This command outlines the selection with a smooth curve and changes the menu bar to display the Pen menu. Choose Save Path from the Pen menu, naming the path whatever you like. Then choose Exit from the Pen menu.
4. Choose Save As from the File menu, and in the Save As dialog box choose EPS from the File Format pop-up menu. After you click Save, the EPS Options dialog box appears. In it, choose the path you saved in step 3 from the Clipping Path pop-up menu, set the other options as you like, and click OK.
5. Your page-layout program may be able to use the clipping path in the EPS file to define the boundary for text runaround, or text wrap. In QuarkXPress 3.2, for example, select the picture box and use the Run-around command to specify Auto Image as the runaround mode. (In PageMaker 4.2 you must manually create a custom text-wrap boundary as described in the reference manual that comes with PageMaker.)



continues

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J. Travelwise, Foreign correspondent

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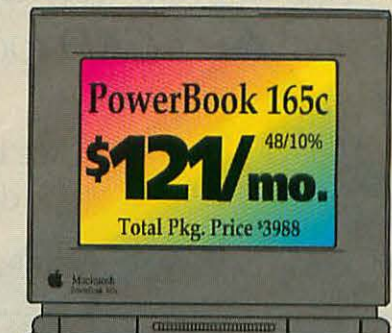
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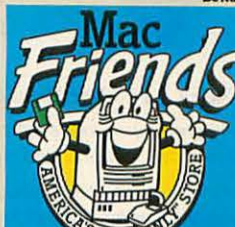
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modules appear more frequently than others, provided you don't mind using up some disk space. Just open the After Dark Files folder (inside the Control Panels folder in System 7; inside the System Folder in System 6) and make duplicates of the modules you wish to appear more often. Sequentially numbering the duplicates is a simple way to give each a unique name, for instance Satori 1, Satori 2, and Satori 3. With ten modules selected in the Randomizer, including three Satoris, Satori has a 30 percent chance of appearing, while each of the other selected modules has only a 10 percent chance.

James Snyder
Anchorage, Alaska

Here's a related tip from Scott McDowell of Portola Valley, California. You can also use duplicate modules with Randomizer to see multiple variations of a module. For example, you can use duplicates of the Messages module to see different messages appear on the screen. To accomplish this you make duplicate modules with the Finder, and then use the After Dark control panel to make different settings in each of those duplicates and to select all the duplicates in the Randomizer module.

Transparent Labels

TIP If you've avoided System 7's labels because they discolor your beautiful color icons, wait no longer. You can label a color icon without changing its color if the label color is black, white, or any shade of gray. Those label colors appear transparent when applied to color icons. You can still view Finder windows by label, use labels to designate items that StuffIt SpaceSaver should always compress or never compress, and so on.

To change a label's color, open the Labels control panel and click the color of a label you want to use. The standard Color Picker dialog box appears, with its characteristic color wheel. Set the Hue and Saturation to 0, and then set the Brightness to 65535 for white, 0 for black, or a number between those two for a shade of gray. You can type the three values in the spaces provided, or you can click in the center of the color wheel and adjust the scroll bar.

Leslie Jones
Maryville, Tennessee

On a color monitor, icons with white labels are invisible unless they are selected.—L.P.

Backup Preferences

TIP I always make sure I have backup copies of my preferences files saved on my hard drive or on a floppy disk. I never know when my favorite application's preferences may become

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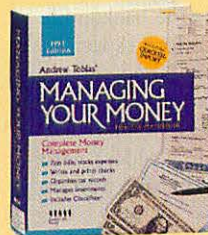
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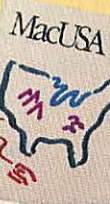
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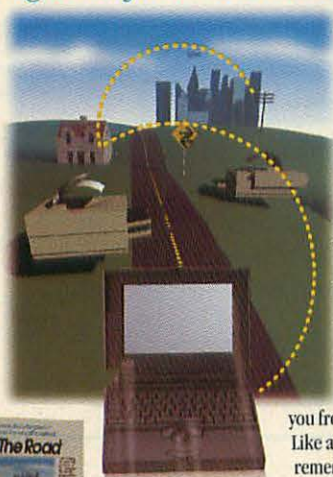
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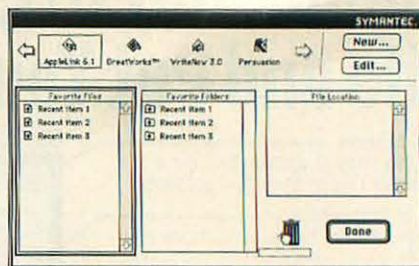


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HOW TO/QUICK TIPS



Directory Assistance Workset Removal In Directory Assistance II, which is part of the Norton Utilities for Macintosh 2.0, the Workset Configuration dialog box includes a Trash icon for removing files and folders from a workset. You can also drag a workset icon to the Trash icon to remove the entire workset.

corrupted or when I may need to reinstall the application, forcing it to create a new preferences file. Restoring the backup file can save a lot of time and effort, especially when I've forgotten how I had set my preferences. Most applications keep their preferences files in the special Preferences folder (inside the System Folder) with System 7, and directly in the System Folder with System 6.

Beckie Pack
Napa, California

You'll find some preferences files—and in some cases preferences folders—directly in the System Folder even with System 7. Moreover, a few applications keep preferences files in the same folder as the application.—L.P.

Works 3.0 Conversion Shortcut

TIP After updating to Microsoft Works 3.0, you may find that converting documents from version 2.0 format one at a time gets pretty tedious. If you have System 7, use the following method to streamline the job. Select a group of Works 2.0 documents in the Finder by shift-clicking them or by dragging a selection rectangle around them; now drag them as a group to the Works 3.0 icon. Works will open and convert them all automatically. Then save and close each converted document in turn.

Roberta Nelson
Chehalis, Washington

Directory Assistance Tricks

TIP The manual that Symantec includes with Norton Utilities for Macintosh 2.0 describes how you use the Directory Assistance II utility to create custom worksets for individual applications and projects. But it doesn't say how to get rid of worksets you no longer need. The solution is to choose Configure from the Workset menu at the right end of the

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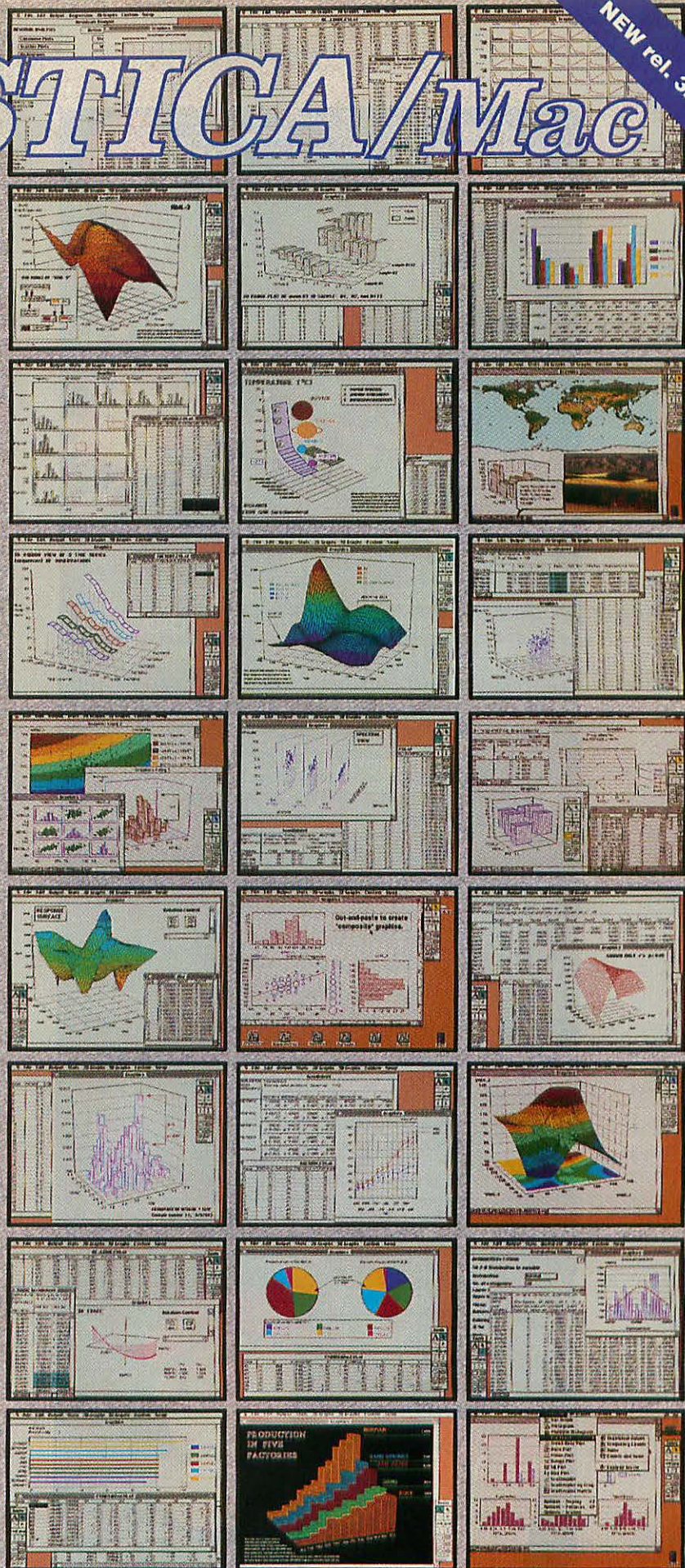
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menu bar that Directory Assistance II adds to the directory dialog box. This brings up the Workset Configuration dialog box, which includes an icon for each workset and a Trash icon (see "Directory Assistance Workset Removal"). Drag the icon representing the unwanted workset to the Trash icon in the dialog box. Careful! Once you drag a workset to the Trash, you can't get it back.

There's another undocumented aspect of Directory Assistance II. Although the manual describes how to disable Directory Assistance II for individual applications, it does not explain how to reenable Directory Assistance II. A brute-force method is to drag the Directory Assistance Preferences file from the Preferences folder inside System 7's System Folder (or from System 6's System Folder) to the Trash. Unfortunately, this removes all Directory Assistance settings.

*J. Hebenstreit
Paris, France*

If you have disabled Directory Assistance for an application, you can temporarily activate it by pressing option while choosing Open or Save As from that application's File menu. Then you can reenable Directory Assistance by choosing the third item from the Directory Assistance menu (which is marked by a diamond at the left end of the Directory Assistance menu bar in the directory dialog box) and turning off the Bypass Directory Assistance option. (If Directory Assistance is enabled, pressing option while choosing Open temporarily disables it.)—L.P.

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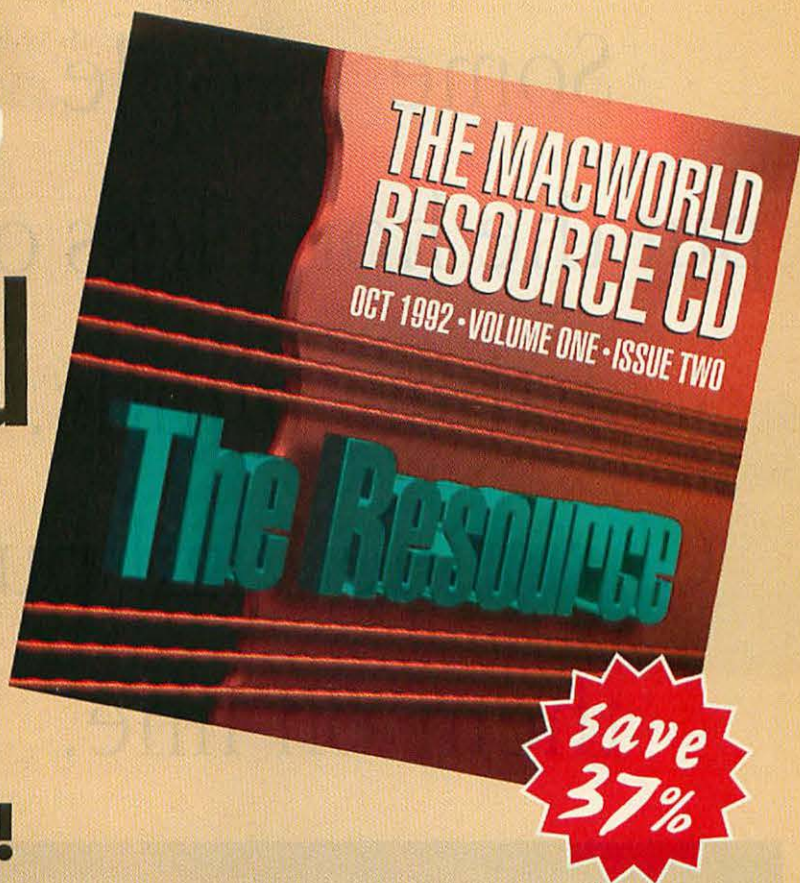
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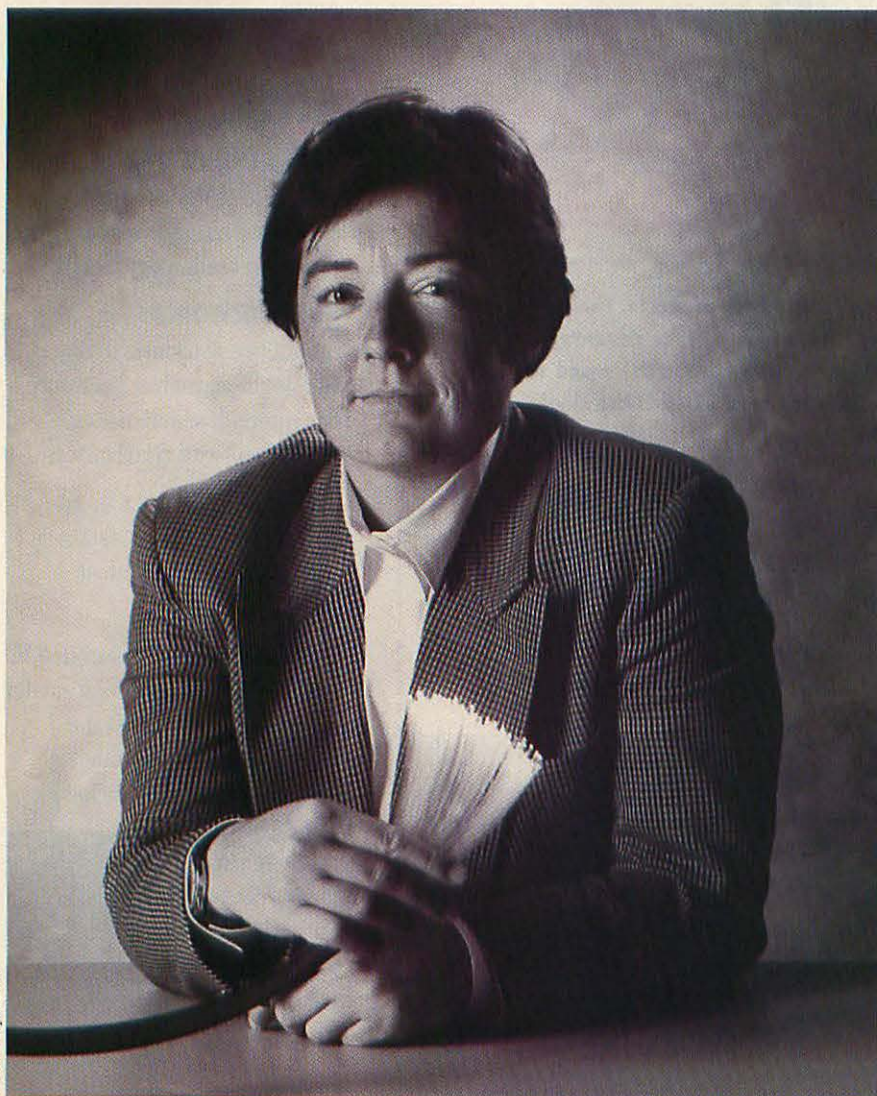
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Circle 217 on reader service card

Some people put the homeless out of their minds. Christine Vigil put them on-line.



In 1906 St. Vincent de Paul was founded to help people left homeless by the San Francisco Earthquake. Today, they're an organization that helps thousands of homeless people nationwide. By finding them shelter, medical care, rehabilitation, and jobs.

That's where Christine came in. Before she got involved, St. Vincent de Paul worked with 75 other San Francisco social service agencies matching homeless people with available jobs. The Job Finders Alliance worked hard, but since they only communicated by memo and phone, it could take up to three weeks to match a qualified person with an open job.

By using her computer skills, Christine was able to put St. Vincent's on-line, and make the whole process more efficient. As a direct result of her efforts, today St. Vincent's has been able to find jobs for their people far more rapidly. And make better matches, because they have access to a comprehensive database.

Of course Christine is just one example. There are a lot of ways you can put your special computer skills to a much appreciated use, whether you specialize in telecommunications, system debugging, or basic software training. To know more, call CompuMentor™ at 1-800-659-3579. We'll put you in touch with a local non-profit organization whose needs are compatible with your area of expertise.

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Data-Exchange Techniques

BY JIM HEID

NO JOB SPECIALIST ALWAYS works alone. Sooner or later, everyone needs to collaborate with others to finish a particular project.

No single Macintosh program can do everything either, so eventually you need to combine programs to perform a given task. You may want to include a drawing or a bar chart in a word processed report. Or include a logo designed in Adobe Illustrator in a document you're creating with Aldus PageMaker. Or transfer a list of names and addresses from a database into a word processor to produce a phone directory.

Last month, I showed how you can use disk files to accomplish these and other data-exchange tasks. The Mac provides other ways to exchange data between programs, techniques that are either faster and easier or more sophisticated than exporting and importing disk files.

All mainstream Mac programs provide cut, copy, and paste commands that let you move small amounts of information between documents and between programs. These commands are the keys to the Mac's *Clipboard*, the basic data-exchange system for moving text and graphics between documents and programs.

More and more programs also support an advanced data-exchange system that is built into Apple's System 7. Unlike the Clipboard, System 7's *publish-and-subscribe* feature makes it easy to update information that you transfer between programs—when the bar graph changes in the original program, the version you included in the word processed document changes, too.

This month, I describe some of the subtler points of the Mac's Clipboard, and I present some scenarios that show System 7's publish-and-subscribe features in action in two different settings: in a desktop publishing shop and in an office. I'll wrap up with a look into the crystal ball at some of the advanced data-exchange options System 7 will soon make possible.

Clipboard Formats

MOST OF THE TIME, THE CLIPBOARD'S operation is straightforward. But there can be times when things you've pasted don't

quite look the way you want them to. After pasting some text from one program to another, you might find that the text appears in a different font or size, or that you can no longer edit it. To understand why these formatting problems occur, it helps to step back and examine how the Clipboard works.

When you cut or copy something to the Clipboard, the application program stores the cut or copied material in one or more *Clipboard formats*. Just as a file format describes how information is organized on disk, a Clipboard format describes how information is stored in memory by the Clipboard.

The Mac provides three standard Clipboard formats. The *PICT* format stores information (whether text or graphics) as a picture. The *TEXT* format stores only text, with no font or type-size formatting information. The *styl* format stores text as well as font and size information. (If you have Apple's QuickTime system extension installed, a fourth standard format is available: the *moov* format, which stores the frames from a QuickTime movie.)

Besides these standard Clipboard formats, the Clipboard also supports *private* data formats—formats defined by a specific program. Private formats are designed to reflect the type of information a particular program creates, and retain more formatting information than do the standard Clipboard formats.

Application programs usually place data on the Clipboard in one or more standard formats as well as one or more private formats. Why so many formats? To increase the odds of being able to retain as much formatting as possible when you paste the information into another program.

When you choose Paste, the receiving program peruses the Clipboard in search of a private format it can understand. If it finds one, it pastes the data using the private format, thereby retaining all formatting information. If the program doesn't find a private

format it understands, it substitutes the standard format—*TEXT*, *PICT*, or *styl*—that is closest to its preferred one. For example, word processors work with text, so they generally choose the *styl* or *TEXT* format. Graphics programs work with images, so they generally prefer the *PICT* format. "Understanding Clipboard Formats" summarizes these formatting follies.

An example may help clarify how programs treat Clipboard formats. Say you've just copied several cells from a Microsoft Excel spreadsheet because you want to paste them into a Word document. One of the many Clipboard formats Excel uses is called *RTF*—short for *rich-text format*, a format that retains formatting information. (The RTF Clipboard format is very similar to the RTF file format I described in last month's column.) Microsoft Word 5 can read this format, so when you paste the cells into a Word document, all the cell formatting is retained. But what if you paste the cells into WordPerfect, which can't read the RTF Clipboard format? In this case, WordPerfect uses a Clipboard format it does understand—*TEXT*—and accepts the contents of the cells, but without any formatting.

So, when some text you paste loses its formatting, it's probably because the only Clipboard format both programs support is the *TEXT* format, which discards formatting information. To retain formatting when using the Clipboard to transfer text between two programs, make sure each program supports either the same private Clipboard format or the *styl* format. If they don't, then try using the receiving program's open or import command to bring in the contents of the sending program's file. That may be the best way to transfer the text, since both programs probably support at least one file format in common that retains formatting information.

How can you tell which Clipboard formats a program

continues



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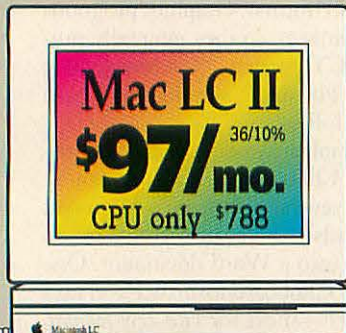
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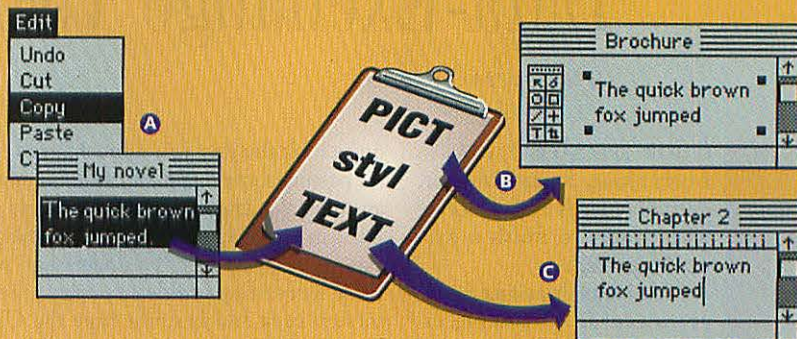
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Understanding Clipboard Formats



When you cut or copy some information from within an application program, the program usually places it on the Clipboard in several formats (A). When you paste the information into a different program, that program will choose the format it prefers. In (B), the receiving program has chosen the PICT format, which transforms the text into a graphic image. In (C), the receiving program prefers the TEXT format, and accepts the data as text.

uses? I have yet to find a manual that tells you, so you need to do some experimenting. Select some information, choose Copy, and then open the Scrapbook and choose Paste. The lower-right corner of the Scrapbook window lists the Clipboard formats in which the data is stored (see "Finding Formats").

Exchanging Data with Publish and Subscribe

WHEN YOU COPY AND THEN PASTE something from one document to another, there's no connection between the receiving document and the original document. If the information in the original changes, you must repeat the copy-and-paste routine to update the information in documents containing it.

System 7's publish-and-subscribe data-exchange system enables you to link documents so that when information changes in one document, copies of it in other documents update automatically. The publish-and-subscribe system also lets you exchange data between Macs connected over a network—another feat the Clipboard can't match. Many popular programs now support publish and subscribe; check out your favorite program's Edit menu—if it contains a submenu named Publishing or Editions or lists commands such as Create Publisher and Subscribe To, then the program supports publish and subscribe.

Using publish and subscribe involves two basic steps.

1. Select the information you want to exchange and choose Create Publisher from the Edit menu. When you perform this step, the Mac creates a file called an *edition*, which contains a copy of the infor-

mation you published. As with the Clipboard, the information may be stored in a variety of formats (indeed, editions support the same standard formats—PICT, TEXT, and styl—as the Clipboard).

2. To put the published information into a document, choose Subscribe To from the Edit menu. The Mac automatically selects the last edition you created.

An optional third step involves telling the Mac when you want new versions of the publisher to be updated. You can specify that information be updated automatically whenever the original document is saved, or only when you explicitly request it (see "Updating Options").

(Desktop) Publish and Subscribe

SAY YOU'RE A DESIGNER USING ALDUS PageMaker to create a brochure for some new clients who keep changing their minds about the logo design, which you created in Adobe Illustrator. Rather than go through the work of exporting and importing the logo each time it's revised, you can use publish and subscribe.

How to In Illustrator, select the logo. Open the Publishing submenu (in the Edit menu) and choose Create Publisher. In the Create Publisher dialog box, be sure the PICT and EPS button is checked. Type a name for the edition file you just created and click on OK. At this point, you can quit Illustrator if you like. If you have enough memory to keep both Illustrator and PageMaker open, you might want to do so in order to see publish and subscribe in action.

In PageMaker, open the Editions submenu (in the Edit menu) and choose Subscribe To. Make sure that the correct

continues

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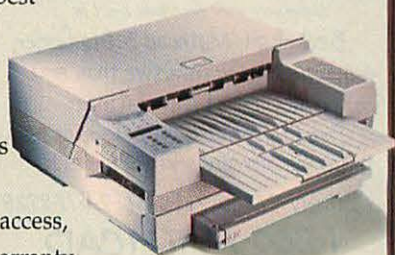
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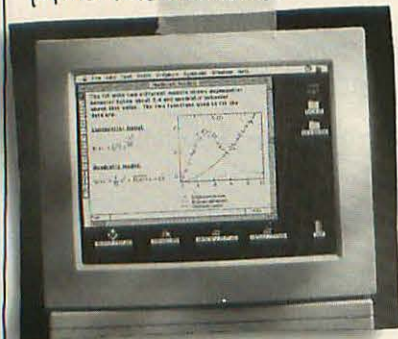
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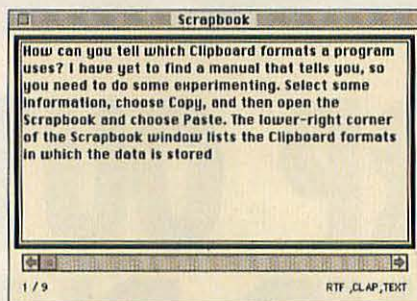
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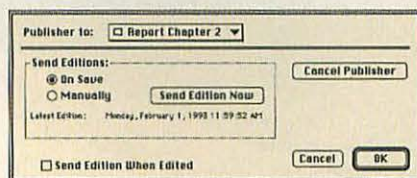
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Circle 34 on reader service card



Finding Formats To determine which Clipboard formats a program uses, copy some information and then paste it into the Scrapbook. The formats appear in the lower-right corner of the Scrapbook window. If you cut or copy that Scrapbook page and then paste its contents into a program, the program can choose any of those formats.



Updating Options A program's Publisher Options dialog box lets you specify when updated information should be sent to subscribers: automatically when you save the document, or only when you specify. Most programs add additional options to the Publisher Options dialog box: Microsoft Word (top) lets you specify that editions be updated as soon as you make changes (choosing this option can slow Word's performance). Adobe Illustrator (bottom) lets you specify whether the edition should contain a PICT version of the image or both PICT and encapsulated PostScript (EPS) versions.

edition file is selected and then click on Subscribe. In a moment, the PageMaker mouse pointer will change shape to indicate that it's "loaded" with a PostScript illustration. Click on the layout to place the illustration.

Now when you change the original logo and then save it, the version in PageMaker updates to match it.

Publish and Subscribe in Business

IN THIS SCENARIO, YOU WORK IN AN office and your responsibilities include assembling a monthly status report for the executive staff. The report is written by several managers, and each manager's contribution undergoes several revisions before the final version is complete. (This is a common scenario not only for status reports, but for technical manuals and proposals, too.)

By using publish and subscribe along with System 7's file-sharing features, you can streamline the process of assembling and updating each report. I've used Microsoft Word, but you can substitute any word processor that supports publish and subscribe, including WordPerfect.

How to First, use System 7's Sharing Setup control panel to activate file sharing, and then use each Mac's Chooser desk accessory to connect to the shared hard drive. (For more details on System 7 file sharing, see *Getting Started*, *Macworld*, January 1993.)

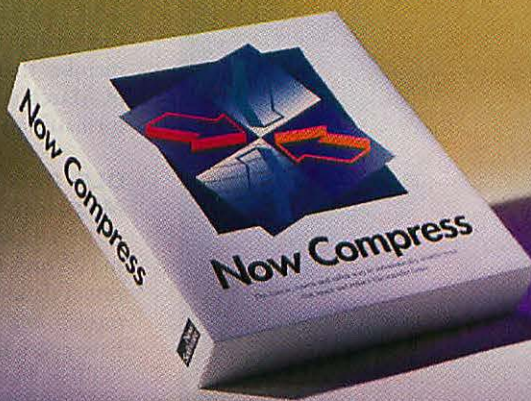
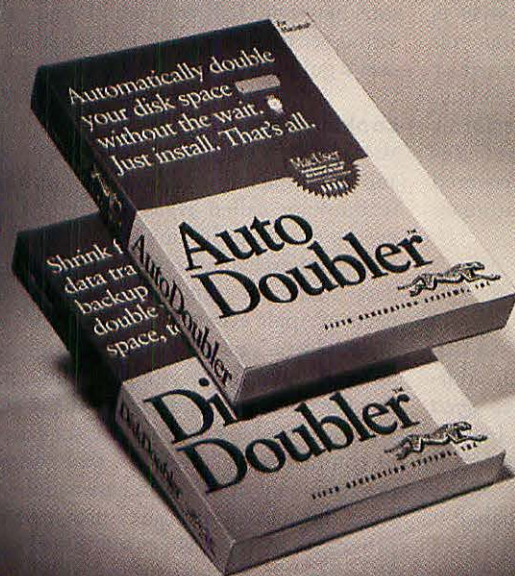
The instructions in this paragraph are for each contributor to the report. Write your section, formatting it as you normally do, and then save it on your own—not the shared—hard drive. With the document still open, choose Word's Select All command and then choose Create Publisher from the Edit menu. In the Create Publisher dialog box, click on the Desktop button and then locate and double-click on the name of the shared hard drive. Type a name for the edition file and then click on Publish.

The instructions in this paragraph are for the person who assembles the report from each component. Choose New from Word's file menu. Create any special title page you might want and then choose Subscribe To from the Edit menu. Navigate your way to the shared hard drive and then locate and double-click on the name of the edition file containing the first section of the report. When you do, Word inserts its text. Insert a page break after the text if necessary, and then choose Subscribe To again and insert the next section. Repeat this process until you've inserted all sections.

From this point on, each time a contributor alters and then saves his or her section, the master version of the report changes to reflect the latest version. There's no further copying and pasting, and no fretting about whether someone's latest draft has been incorporated.

It's worth noting that each contributor might be using publish and subscribe in his or her own section. Wendy might use it to link a graph created in Lotus 1-2-3 to the original spreadsheet that generated it, while Roy might use it to incorporate inventory figures from an accounting program. As the underlying documents change, a game of digital dominoes occurs—each contributor's section is updated, causing the master report to be updated, too. (You can even take the game one domino further—if you publish the final report and then subscribe to it within Aldus PageMaker, the publication updates with each revision.)

continues



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Express Report / Jan 93	62.5K	19.5K	69%	Compressed: Faster	B060	CVSS	Thu, Feb 25, 1993
Heartbeats	48.5K	9.4K	79%	Compressed: Faster	EH43	EPIS	Thu, Aug 27, 1992
Newsletter / Jan 93	100.2K	25.4K	75%	Compressed: Smaller	ALD4	ALB4	Fri, Sep 11, 1992
Product Descriptions.ssa	254.7K	---	---	Archived	IKC4	APPL	Tue, Feb 25, 1993
Q1 '93 Objectives	6.5K	---	---	Don't Compress: Rem	HEVD	VDSN	Fri, Jan 1, 1993
Team Photo.TIF	285.3K	36.4K	84%	Compressed: Faster	TFT	TFT	Fri, Jan 15, 1993
Compressed: 5 of 7	712.3K	356.0K	50%				

Attention
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HOW TO/GETTING STARTED

As a subscriber, you can't perform major editing on published information. You can reformat all of the text in a publisher—change its font, size, and style as well as margins and line spacing—but you can't, say, correct a misspelled word or change the font for an individual heading. This is why each contributor performs formatting at his or her machine. (Remember that style sheets, which I covered in March's column, can help automate formatting.)

OLE: Data Exchange, Microsoft-Style

SOME MICROSOFT PROGRAMS, INCLUDING Word and Excel, support an additional data-exchange system called *object linking and embedding*, or *OLE*. I don't have room here to describe all the details of OLE, but I can give you some examples of the kind of dynamic data exchange it makes possible.

In reports and manuals, it's common to refer to figures or illustrations, each of which has a numbered caption. It's also all too common to add and remove figures during revisions—a chore that forces you to renumber all the figure references and their captions. By using Word's Paste Link command, you can simplify the process so that when you update a figure reference, its caption updates, too.

How to When you need to create a figure caption, select the figure number in the figure reference and then choose Copy (see "Fixing Figures"). Next, move the insertion point to the spot where you want the caption to appear. Press and hold down the shift key and choose Paste Link from the Edit menu. Complete the caption with any additional text. From this point on, when you change the figure number in the reference, the number in the caption changes, too.

OLE is often faster and more convenient than publish and subscribe. On the downside, OLE doesn't let you link docu-

ments across a network (unlike publish and subscribe), and only a few Microsoft programs support it. For more comparisons between OLE and publish and subscribe, see page 670 in the Word 5 (or 5.1) user's guide.

Looking Ahead

MICROSOFT'S OLE AND APPLE'S PUBLISH and subscribe rely on a System 7 software technology called *Apple events*. Apple events enable programs to talk to each other and exchange commands as well as data. Many programs support some aspects of Apple events today, but their real promise won't be realized until Apple releases its *AppleScript* system. AppleScript, due for release around the middle of this year, will enable you to create sequences of commands, called *scripts*, that control programs and shuttle data between them. Like the macro languages provided by programs such as Microsoft Excel and WordPerfect, AppleScript will let you put programs on autopilot, reducing repetitive command sequences to a single mouse-click or menu choice.

More important, AppleScript will work together with Apple events to allow programs to collaborate. For example, imagine you have a word processor that supports an AppleScript command to check spelling. Using AppleScript, you could access the spelling checker from within any other program. In short, AppleScript will enable you to combine the best features of your favorite programs. I'll have more to say about AppleScript in an upcoming column.

System 7's cutting-edge data-exchange features are impressive, but in the real world, they're often overkill. Indeed, I have encountered many Macintosh owners who haven't yet mastered the Clipboard and its cut and paste features. If you're in this group, spend some time exploring the Edit menu. Copy a chart from a spreadsheet and paste it into a word processor. Stash your name and address in the Scrapbook so you won't have to retype it.

After coming to terms with the Clipboard, you'll probably start thinking of ways to use publish and subscribe or OLE to streamline your data-exchange endeavors. You'll start combining programs to create documents you couldn't create with any single program. The way the Mac lets you sling text and graphics between programs has always been one of its unique strengths. Take advantage of it. **m**

Contributing editor JIM HEID looks at a different aspect of Mac fundamentals each month. His latest book is the second edition of *Inside the Apple Macintosh* (Brady, 1992), which he coauthored with Peter Norton.

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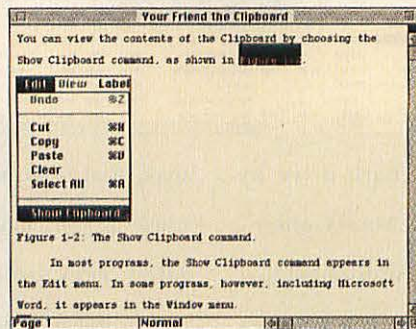
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Fixing Figures Here, a figure reference (the selected text) has been copied and inserted into the figure caption (below the figure) using Word's Paste Link command. If the figure number in the reference changes, the number in the caption changes automatically.



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Circle 73 on reader service card

BY CARY LU

PowerBook

Notes

Keeping Your PowerBook and Data Secure

THE POWERBOOK, WHOSE PORTABILITY you prize, is just as appealing to a potential thief—who can take off with it as easily as you can. As with other portable, high-value items, portable computers have become choice items for criminals. The skyrocketing rise in laptop-computer theft has hit all kinds of users, from General Norman Schwartzkopf to Compaq chairman Ben Rosen.

Outright theft is just one part of the problem. Your data may well be much more valuable than your computer; plans for a new product might be leaked to or stolen by a competitor, electronic mail could conceivably lead to blackmail or legal tangles. A business colleague or a child can easily scramble your hard drive. Everybody wants to play with a Mac.

Although many products attempt to address one security area or another, all security products are by their nature inconvenient. We accept a lot of inconvenience in our daily lives—locks on doors, inspections at airports—yet most of us have had unrestricted access to our personal computers. Many people find security products so bothersome that they disable them after a time; balancing the need for security and the desire for convenience can be a challenge.

The Simplest Steps

THE FIRST THING YOU SHOULD DO IS record all serial numbers and label everything that belongs to you, including batteries and cables. This way your stuff won't get mixed up with somebody else's, and honest people will return equipment that you mislay somewhere. Use a business phone number if possible and don't include a home address, which thieves might target if you are traveling. You might consider putting a label inside a



PHOTOGRAPH BY PAUL FRANZ-MOORE/SCREEN IMAGE BY JIM LUDTKE

computer so that if it is ever stolen, you might be notified by a repair service. And if your equipment is stolen, notify the Stolen Computer Registry (212/777-1291) so insurance companies, service centers, and some resellers will be alerted to your serial number.

Holding On

HOW DO YOU PREVENT THEFT? A portable alarm system can help, provided you take great care to avoid false alarms—the shrill sound can be extremely annoying to innocent bystanders.

Portable motion-detector alarms sound off if moved. All work with a delay before sounding the alarm, to give you time to disarm the unit (generally done by entering a few digits on a keypad). Prices start at about \$60 for a unit that can be placed inside your computer's carrying case. The \$99.95 Sonicpro model 128 (408/982-2568, 800/848-0300) is programmable for motion sensitivity, alarm delay, and alarm duration. The 5-ounce

Sonicpro, about the size of a pack of cards, can be glued on to a PowerBook's cover.

In addition to alarms, you can try camouflage. Carrying a PowerBook in a dirty, nondescript case may make it appear less inviting than one in a spiffy case with a logo that announces "I'm a valuable laptop computer! Steal me!"

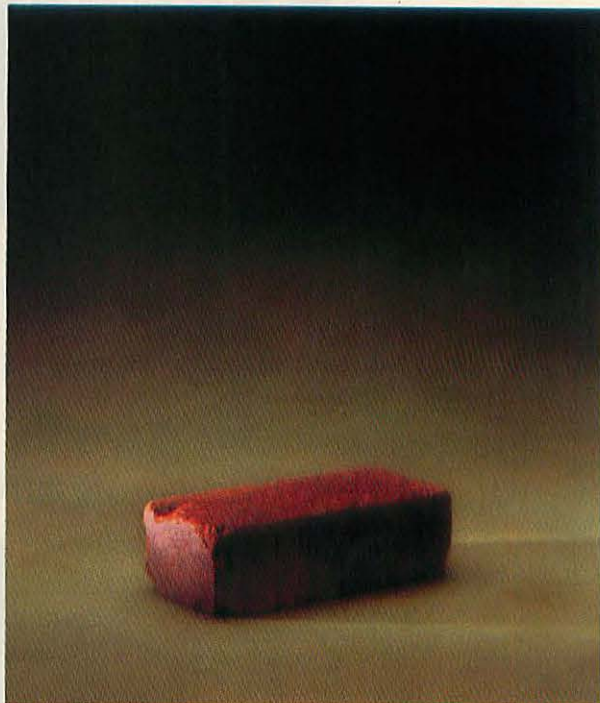
Inevitably, you have to pull out your PowerBook to use it. Can you leave the PowerBook in place on a table? The Sonicpro alarm, if glued to the computer, provides some protection by sounding off if the PowerBook is moved, but you will certainly have many false alarms.

A cable lock offers less-intrusive protection. You can loop the flexible cable around something permanent, heavy, or bulky enough to discourage tampering. A cable won't stop a determined thief with a hacksaw or prevent someone from smashing the computer, but it will discourage casual, opportunistic theft.

You can choose from several kinds of cable locks. The PowerBooks 160, 165c, 180, and the Duo Docks (but not the Duos) have a small security slot (designed by Kensington) molded into the back edge. AST, Compaq, Toshiba, and other computer companies use the same slot in some models. Kensington (415/572-2700, 800/535-4242) also makes a \$60 mating MicroSaver cable assembly that weighs 5.5 ounces (including the cable and a key). The security slot offers a neat way to attach a cable; if you attach one, make the cable as obvious as possible, so a potential thief—or prankster—sees it before starting to walk off with the computer and possibly dropping it.

The Notebook Guardian from PC Guardian (415/459-0190, 800/288-8126) attaches to the front of the PowerBook (models 140 through 180), locking through a screw hole and front-latch

continues



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opening. The 6.5-ounce, \$79.95 Notebook Guardian is more awkward to use than the MicroSaver cable, but it's clearly visible and can, if you wish, lock the screen closed; it also comes with a carrying pouch. For the PowerBook 100 and the Duos, PC Guardian offers a \$29.95 adhesive locking connector.

Another kind of cable lock, the 6.4-ounce PowerLock (\$49.99; CMG Computer Products, 512/329-8220, 800/880-9980), clamps on the side or front of a closed PowerBook. The PowerLock exerts no pressure; it mates with two striker plates that you insert into the edge of the keyboard or in the cover latch before you close the PowerBook. The clamp design works on all PowerBooks except the Duos; a smaller model will be available for Duos. The PowerLock secures only a closed PowerBook, so I consider it the least convenient of the three cable-lock designs; but it is highly visible and will deter anyone from using the computer. CMG also makes a \$69.99 monitor stand with a locking drawer for PowerBooks that can be secured to a desk.

If your company has many laptops and other valuable equipment, you can install a security tag system similar to the anti-theft systems used by retail stores. A typical tag system uses a sensor at every entrance (about \$2300 per door, including installation) and a \$1.25 tag in each protected item. A keypad next to the sensor can override the alarm system for authorized equipment-removals.

Finally, if you see someone trying to steal a computer, consider your own protection first. Your safety is worth more than any computer; don't get hurt trying to recover it. Instead, plan ahead. What will you do if someone does steal your PowerBook?

Information Theft

IN THE PAST YEAR, THERE HAVE BEEN several published reports of criminal organizations hired on contract that are stealing laptop computers (or copying files). And persistent reports in the press charge that the espionage agencies of nominally friendly countries spy on foreign businesses for the benefit of domestic companies. In the United States, members of Congress and the intelligence community have suggested that American government agents ought to respond by spying on foreign businesses.

Beyond business information, a PowerBook can contain many other kinds of sensitive information. Loss of medical records and legal notes might breach confidentiality rules or laws. Think of what

someone with a mischievous or more sinister intent might do with your passwords for electronic mail, dial-up networks, and online services—or your telephone credit card number.

Protecting Telecommunications

ANYONE WHO USES YOUR COMPUTER can also connect to the telecommunications services you use, if you have automated the log-on sequence. Two simple precautions might help. First, enter the passwords manually—don't store them anywhere on the computer. Second, carry the customer-service phone numbers of the online services so you can call and cancel accounts if your computer is stolen, just as you would for credit cards. Your telephone credit card number or corporate long-distance access code might be in a dialing sequence for a communications program. You could enter these numbers manually to avoid storing them on disk. Following such precautions is a nuisance, but then so is the process of locking your house.

For file transfers in which you can control the software at both ends, security is straightforward if you encrypt the file before sending it (see below). If your E-mail system supports file enclosures, simply attach the encrypted file. If the mail service supports only text files, you must first convert the encrypted file into text-only format with BinHex, a \$10 shareware program available from user groups and online services. The receiver must use BinHex to recover the file and then decrypt it. If you do this, test the entire process thoroughly before you use it for real messages; the spurious characters generated by some E-mail systems can render a message unrecoverable.

Fax images are harder to protect. A fax modem in your PowerBook offers some privacy compared with the typical office fax machine, which generally sits out in a public area where anyone passing by can look at incoming messages (and outgoing messages are frequently left in the machine's tray for some time after they've been sent). Some fax machines offer a password feature, but no current fax-modem software is compatible with such features. The only practical way to ensure privacy today is to ask the person receiving the fax to stand guard at the fax machine while it arrives.

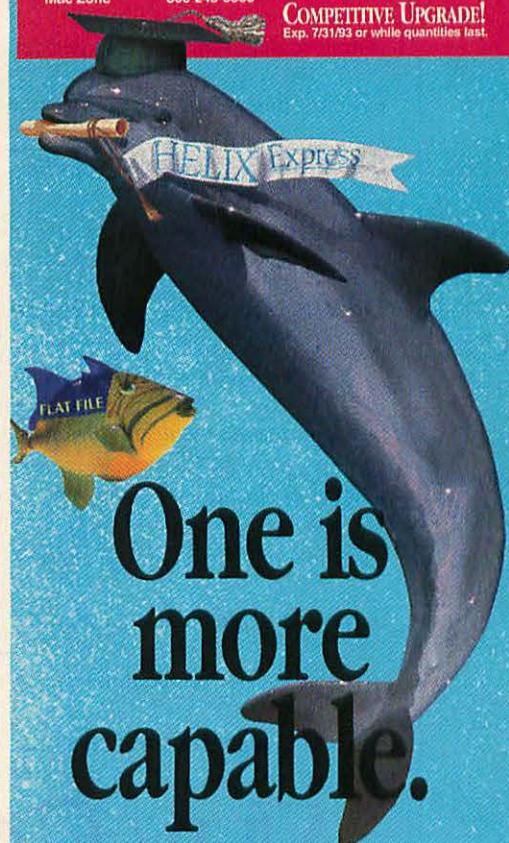
Even with a password, the fax image travels over the phone line using standard, easily intercepted fax protocol. At the moment, real security for fax is possible

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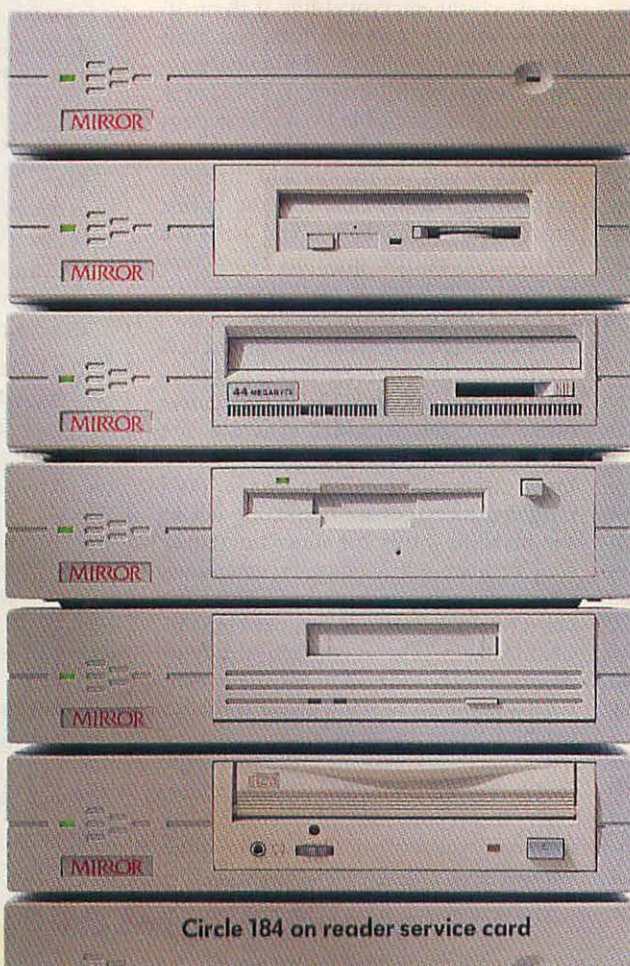
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only through an expensive hardware accessory. The \$1995 AT&T model 3700 fax encryptor connects between a fax machine (or modem) and the phone line and sends a secure image to another fax machine or fax modem equipped with a second encryptor. AT&T's encryptor weighs 6 pounds and runs off A/C power, so it's intended mainly for office use.

Instead of faxing an image, you could scan it and then encrypt and send the resulting graphics file to another computer that can run matching software to recover the image. This somewhat cumbersome procedure might be justified for high-security situations. A PowerBook could receive and display such messages without undue difficulty, although unless you carry a scanner with you, sending such images from a PowerBook is generally impractical.

A new generation of modems based on digital signal processing (DSP) chips should be available in 1994. DSP chips are far more versatile than current modem chips and should support much more secure fax and data communications by setting up custom modulation schemes. A secure link will require compatible DSP modems at both ends.

Network Security

ANY NETWORK SET UP FOR REMOTE access via modem needs careful attention to security. If you use AppleTalk Remote Access (ARA), the first thing you should do is disable guest access (from the Setup menu, choose Users & Groups; make sure that the box under Remote Access is not checked).

The second thing to do is set ARA to callback rather than let it accept calls directly. With callback, you dial into the network and enter a password, then hang up. The network modem checks your password, retrieves your phone number from those stored in memory, and then dials your modem; only on this second call are you allowed to log on to the network. Thus an anonymous caller can't access the network without redirecting phone lines. But if you are traveling, you may need to change the callback number frequently. And callback usually works only if the network modem can dial your modem directly without going through, say, a hotel operator.

A network manager should also carefully consider the access a user really needs; ARA can be set so callers have access to files on the answering Mac only, not to the entire network.

Passwords for network access are often a weak link, since many people choose eas-

ily remembered passwords such as their last name or some trendy word. If all users were required to use some punctuation in their passwords, the chances of someone randomly guessing a password would drop significantly. It helps to frequently change passwords. And look around the office—are passwords taped to computer displays? Do you really trust everyone with access to the office?

Passwords and Encryption

YOU CAN CHOOSE FROM MANY LEVELS OF protection for your data. The simplest protection comes with screen-saver programs such as After Dark. You can set the program so that a user has to type a password to restore the screen. Screen-saver programs are also handy for wiping information off the screen in case you find a snooper lurking nearby. It's actually a fairly common problem; if you fly to or from a trade show, the person in the next seat may well work for a competitor.

Screen-saver passwords offer minimal protection; anyone can restart the computer and bypass the password. Setting file and folder password protection limits access (to those levels) to someone with a password. This provides privacy for specific portions of a drive yet still lets people use the computer normally.

At the next level is a hard drive password, which prevents anyone who doesn't know the password from accessing the drive. A hard drive password can be set to work like a screen saver; after some inactivity, the computer automatically locks up. Optionally, the floppy disk drive can be locked as well. Disk-password programs work well for casual data-protection where a would-be snooper is unlikely to be a particularly knowledgeable computer user—but all can be easily circumvented.

Of the many disk-password programs, SafeLock Mac is the least expensive at \$49 (Trend Micro Devices, 310/782-8190, 800/228-5651). Many disk-formatting programs and utility collections include password features, so you may not need to buy a new product at all.

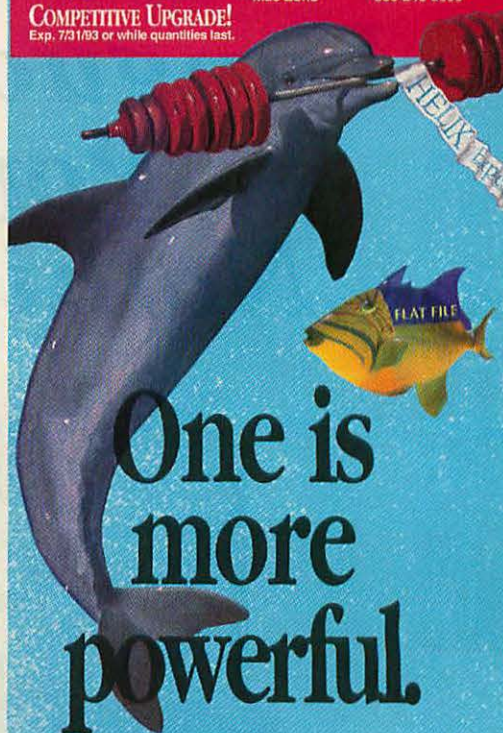
Password systems do not change any of the files on the hard drive. Since forgetting a password is a frequent problem—probably more common than data theft—many password systems have a fallback. Some companies that produce this type of software can give you a higher-level password that will unlock the drive (or file) after you verify that you are indeed the legal owner of the software and computer (verification required may include the

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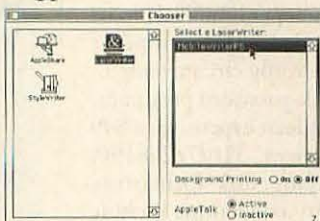
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Encryption systems go beyond password systems by encrypting the files so that no one can read the contents without a password. Every time you save, the system performs encryptions; every time you read, it does decryption. Most programs offer two or three encryption levels. The simpler levels work quickly but offer less security than the more thorough DES (Data Encryption Standard) encryption, the federal government standard.

DES encryption depends on "keys," or passwords—the weak link in many encryption products. To make the process automatic, many encryption programs store the key within the encrypted file. A sophisticated snooper simply looks for keys, a much simpler challenge than trying to break DES. Manual key-entry is more secure, and a key should use the full ASCII character set, complete with punctuation marks and uppercase and lowercase letters.

With high-level DES encryption, the keys are vital; if you lose the key, you've lost the file. You have to balance the risk of an information leak against the risk of losing the information itself by forgetting the key. Keys should not be stored anywhere on your hard drive. A snooper could easily try every name in your address book as a key, for example. A small flaw in your hard drive could potentially make an encrypted file unrecoverable, unlike a plain text file, where the flaw might garble a few words but leave everything else readable. If you use serious encryption, consider keeping a decrypted version of each file on a floppy disk or some other backup medium as well. Hide the disks or store them in a safe. Regardless of security systems, back up your files so you still have them if you lose the computer.

For an excellent survey of encryption software programs and their relative security, see Bruce Schneier's article "Data Guardians," *Macworld*, February 1993. For DES encryption, Schneier recommends Citadel with Shredder (\$99, from DataWatch Corporation, 919/490-1277); he also recommends ultraSecure (\$239, usrEZ Software, 714/756-5140), which has many options Citadel doesn't have, including simple password features and automatic encryption. As he points out, however, some of these additional features can compromise security.

The most robust security product for the Macintosh is free. PGP (Pretty Good Privacy), developed by Philip Zimmerman, includes complete support for public-key encryption, a way to send secure

messages even to people you don't know. It's available on Internet at several FTP sites. Try, for example, mac.archive.umich.edu; look in the directory path/mac/util/encryption.

Moving toward Paranoia

WHEN YOU ERASE A FILE, YOU DON'T actually erase the magnetic information. Instead, the operating system sets a flag in the disk directory that marks the tracks as available for use. The file data is still on the disk until the tracks are overwritten. That's why utility programs can often recover files even after you've trashed them and emptied the Trash. Moreover, experiments show that overwriting the tracks doesn't always completely erase them; the Department of Defense requires overwriting a track three times to completely erase it; many programs, including Citadel and ultraSecure, perform such multiple-pass erasure.

A spy can eavesdrop on the incidental electromagnetic radiation generated by all computers. A PowerBook doesn't have the high-voltage CRT that radiates from desktop computers, but its plastic case does not shield as well as metal. The U. S. government security agencies set a radiation standard called Tempest that must be met by electronic equipment used for highest-security work. Tempest-qualified computers are sold only to the government and approved government contractors; they are not available for ordinary commercial purchase. No PowerBook has yet been converted to meet Tempest specifications, although Grid has a PC-compatible laptop that meets Tempest specs. Hetra (703/709-0800) and Mitek (703/318-7030) offer Tempest-qualified desktop Macs to qualified buyers.

Do business spies use incidental radiation to eavesdrop on PowerBooks? They could, but it's so much easier and cheaper to bribe a hotel employee to let them into a hotel room to copy files or comb through wastebaskets that most probably don't bother.

So you should watch what you throw away, along with everything else. Or maybe, if you are competing on a bid against another company, you should throw away or store some spoof information in your computer—an artificially high bid, for example. As long as someone is spying on you, you may as well take advantage of it. ■

CARY LU is a Macworld contributing editor who covers PowerBook-related issues in this monthly column.

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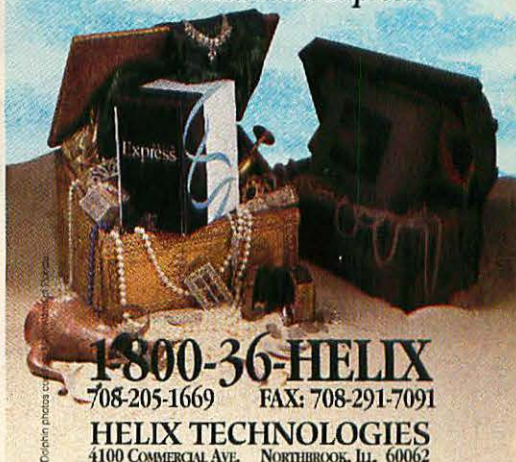


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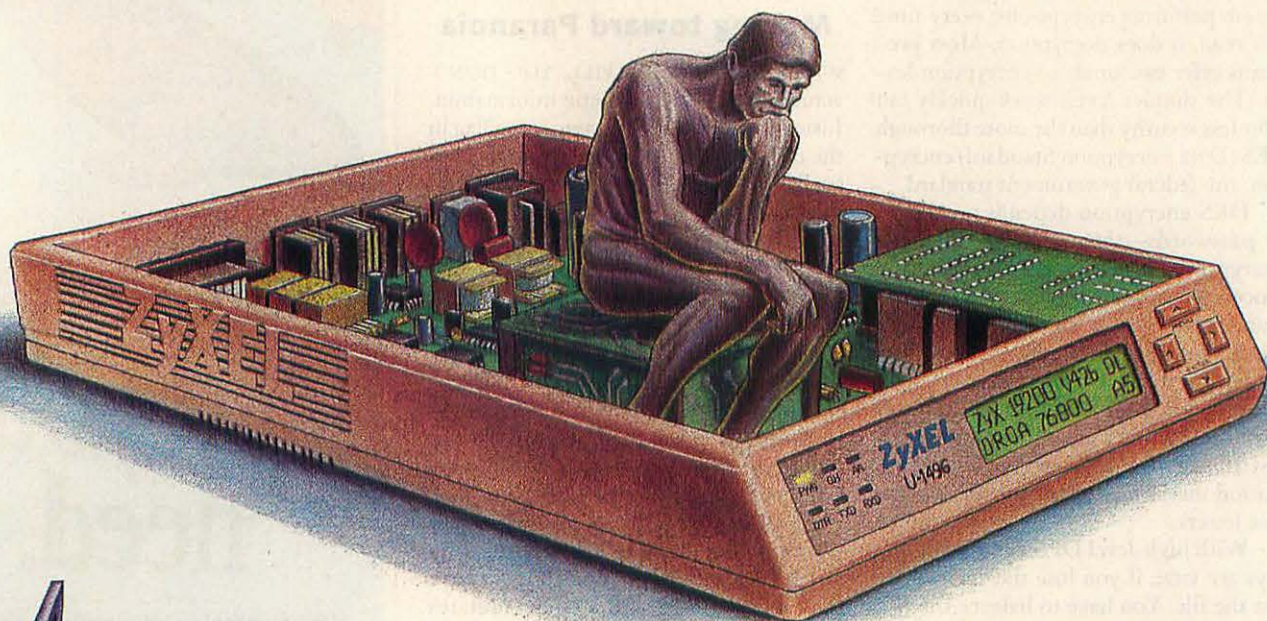
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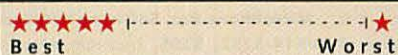
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ACCOUNTING/FINANCE

★★ **Andrew Tobias's TaxCut for Macintosh**, MECA Software, 203/256-5000, \$79.95. The occasionally awkward interface of this personal tax-preparation software doesn't follow every Mac standard, but the help system is very good. State versions are available for California and New York. May 93

★★ **Business Sense 1.6**, Business Sense, 307/877-2231, \$199. Competent, single-user, all-in-one bookkeeping package will adequately help you keep the books for a small company, but it's not as easy to use as its competition. Feb 93

★★★★ **Components 1.0**, Satori Software, 206/443-0765, \$795 per module. Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is not without its bugs and flaws. Sep 92

☐ **Great Plains Accounting 6.0 (6.1)**, Great Plains Software, 701/281-0550, \$795. High-end bookkeeping software offers a first-rate lineup of dedicated modules. Different individuals or groups can easily use the various accounting functions.

★★ **HyperTax Tutor 1991**, SoftStream International, 508/991-4011, \$99. If you're willing to put up with a design that's neither intuitive nor easy to use, this cross-referenced book contains extensive explanations, strategies, and examples of complex IRS tax laws. Apr 92

★★★★ **Job Cost/Time Billing 1.05**, Satori Software, 206/443-0765, \$1495. Professional billing software incorporates high-end job-cost and accounts-receivable features in one module, plus an excellent report function; but confusing elements, minor bugs, and inaccuracies in the documentation are weaknesses. Aug 92

★★★★ **MacInTax 1992**, ChipSoft, 619/453-8722, \$79.95. It's difficult to correct your errors when using this personal tax-preparation software, but it's definitely easier than doing your taxes by hand. The display is attractive, the program supports electronic filing, and there are 15 state-tax versions available. May 93

★★★★ **Managing Your Money 5.0**, MECA Software, 203/256-5000, \$79.95. An already strong financial-management program becomes easier to use and slightly more powerful with this upgrade. Jan 93

☐ **MYOB 3.0**, Teleware, 201/586-2200, \$199. A file-cabinet metaphor makes the interface of this accounting package easy to use and understand. For an accounting system with one user who has no need for payroll capabilities, it's the best choice.

☐ **Quicken 3.0**, Intuit, 415/852-9696, \$69.95. Track assets, liabilities, income, and expenses with this personal-finance package. It has a good Mac interface and is easy to learn and use.

★★★★ **Timeslips III 2.1**, Timeslips Corp., 508/768-6100, \$299.95. Complexity is the price you pay for this time-billing utility's impressive flexibility. Fortunately, thorough documentation, excellent tech support, and default settings help any user get started. Sep 92

★★★★ **WealthBuilder 2.0**, Reality Technologies, 800/346-2024, \$79.99. Financial-planning software forces you to think about your money and helps you develop an investment plan. It's a good program for beginning investors, but more-sophisticated investors will want more-advanced features. May 93

BUSINESS TOOLS

★★★★ **4th Dimension 3.0.1**, ACI US, 408/252-4444, \$895. Multitasking, which greatly improves speed in a carefully designed application, makes this upgraded relational database delightful for both developers and end users. For a relational database, it's impressively easy to use. Apr 93

★★ **AccuZip 1.5.2**, Software Publishers, 714/846-1908, \$899. Professional-level mail-list management tool on CD ROM is the most comprehensive system available, but its messy documentation and inexcusable user-interface violations make our reviewer reluctant to recommend it. May 93

★★★★ **Aspects 1.01 (1.03)**, Group Technologies, 703/528-1555, \$285 to \$1295. Collaborative software allows up to 16 people to edit a project. Con-

trolled access as well as individual and linked views are good features, but the lack of outlining and spreadsheet modules limits its usefulness. Jun 92

★★★★ **Atlas Pro 1.0.6 (1.5)**, Strategic Mapping, 408/985-7400, \$795. Although this mapping software is not a complete geographic-information system, it boasts a rich feature set and a competitive price. Nov 92

★★★★ **Bar Code Pro 1.0**, Synex, 718/499-6293, \$450. Easy-to-use desk accessory creates bar codes in EPS or PICT for use in desktop publishing or labeling programs. It does well what it sets out to do, but lacks automatic sequential coding and fails to catch invalid characters. Sep 92

☐ **Claris Resolve**, Claris Corp., 408/727-8227, \$249. Advanced features come within easy reach of spreadsheet pedestrians with this program. Anyone can learn how to use it in 10 minutes and how to customize it in 20.

★★★★ **DataPivot 1.02 (1.1)**, Brio Technology, 415/961-4110, \$299. Convenient and flexible report-generator includes fast formatting, automatic import, and just about every other item on the wish list of users who need report tables that emphasize cross-tabulation. May 92

★★★★ **DeltaGraph Professional 2.01 (2.02)**, DeltaPoint, 408/648-4000, \$295. A smooth interface and outstanding technical support are only two of the stellar features in this graphing and charting program. This upgrade adds 13 new chart types and a number of presentation capabilities. May 92

★★★★ **Fair Witness 1.1 (1.2)**, Chena Software, 215/770-1210, \$295. A valuable tool for planning any project, this software coherently integrates outlining, information charts, scheduling, and time charts. Oct 92

★★★★ **FileMaker Pro 2.0**, Claris Corp., 408/727-8227, \$399. Easier scripting, improved mailing labels and text-handling, and support for QuickTime and Apple events are the major new features of this upgraded, multiuser, flat-file database. Although it has some minor bugs, this is a strong upgrade to an excellent program. Jan 93

★★★★ **FlowChart Express 1.0**, Kaetron Software Corp., 713/890-3434, \$149. Inexpensive, easy-to-use flowchart software readily meets the needs of most flowchart creators, although those with extensive requirements will still need a larger, more powerful feature set. Jan 93

★★★★ **GeoQuery 3.02**, GeoQuery Corp., 708/357-0535, \$395. Gain geographic perspective with this custom-map generator and data-analysis software that uses zip codes to create "pushpin" maps of files from your spreadsheet or database. Nov 92

★★★★ **GraphMaster 1.31a (1.33)**, Visual Business Systems, 404/956-0325, \$295. Excellent general-purpose charting and graphing program offers a number of unusual features, including pictographs and

Star Ratings

360-degree free rotation. A frequent inability to undo actions is the only serious irritation. May 92

★★★ **GreatWorks 2.0**, Symantec, 408/253-9600, \$299. High marks to this integrated program for including an outlining module and a color paint module. While the integration may not be ideal, it's a solid program, worth a close look.

★★★ **ithink 2.2.1**, High Performance Systems, 603/643-9636, \$695. Although it requires a real training commitment for effective use, this product is an attractive dynamic business modeling system. It's a good bet for identifying cloudy spots in the crystal ball. May 93

★★★★ **Lotus 1-2-3 for Macintosh 1.0 (1.1)**, Lotus Development Corp., 800/343-5414, \$495. Spreadsheet program from the other side holds its own against Mac competitors. Its many strengths include graphing, well-implemented linking, compatibility with the DOS version, and an outstanding Help system. Apr 92

★★★★ **MacProject Pro**, Claris Corp., 408/727-8227, \$599. If you're working on a midsize project and like using PERT charts (where tasks appear in boxes and are connected by straight lines), this may be the project-management software for you. However, the multistep scheduling process and the limited integration between charts are frustrating if you prefer Gantt charts. May 93

★★★★ **Microsoft Excel 4.0**, Microsoft Corp., 206/882-8080, \$495. Create impressive spreadsheets with this upgrade that includes all the features you wished for and more. It's slower, and now needs 2MB of RAM for practical use, but almost all users will want to upgrade. Oct 92

★★★★ **Microsoft Project 3.0**, Microsoft, 206/882-8080, \$695. An amazing range of functions, including new scheduling and formatting, are packed into this upgraded project-management software. The improved tool bar helps novices schedule tasks with push-button ease. Jan 93

★★★★ **Microsoft Works 3.0**, Microsoft, 206/882-8088, \$295. Capable but unspectacular upgrade delivers marginally improved functionality and a welcome face-lift to this integrated program, but there are a number of incompatibilities, odd design choices, and performance flaws. Feb 93

★★★★ **Muse 1.0 (1.01)**, Occam Research Corp., 617/923-3545, \$695. Innovative data-analysis software is based on a large, ambitious vision of how to organize and use data, and is an excellent environment for some data handling. Free-form query language is powerful, but easy to misread. Jun 92

★★★★ **nuBase Pro 1.5 (1.54)**, Tactic Software Corp., 407/832-6691, \$395. Although still slower than FoxBase and without the rich feature-set of 4th Dimension, this is the only relational database that makes it possible for users with no programming experience to design a useful database. Sep 92

★★ **Office Wiz 1.1 (1.1.2)**, Oryx Associates, 415/563-9971, \$695. 4D-based program attempts to integrate calendar, project, and contact management, as well as simple accounting for a multiuser environment, but the complexity of the interface requires a substantial investment in start-up time. Nov 92

★★★ **Omnis 7 1.1**, Blyth Software, 415/312-7100, \$1250. The plain, businesslike functionality of this database-development system produces solid applications without much fuss. Dec 92

★★★★ **OrgChart Express 1.0**, Kaetron Software, 713/890-3434, \$279. Organization-chart software links a database to standard box-drawing functions. Although the learning curve is steep, the effort may be worth it for people who regularly work with large or complex organization charts. Apr 93

★★★★ **Panorama 2.0 (2.06)**, ProVue Development Corp., 714/892-8199, \$395. Disarmingly easy-to-learn flat-file database is full of labor-saving data-entry features, plus it boasts a remarkable macro function that lets you record and play back almost any series of database routines. May 92

★★ **PEMD Discovery 1.3.1**, PEMD Education Group, 707/894-3668, \$189. Unsophisticated data-search and -retrieval routines, limited displays, and a weak manual restrict this graphical data-analysis software's usefulness. Apr 92

★★★★ **Perspective 1.5**, U.S. Data on Demand, 800/352-7352, \$129.95. The level of detail and comprehensive information in this collection of U.S. demographic and economic data is impressive, and the reasonable price puts it within reach of even the smallest business. Sep 92

★★ **PowerPlay 1.0 (1.1)**, Cognos, 617/229-6600, \$695. A good program for a very limited range of business-analysis tasks. The views of data and graphs are small and manageable, and the program tabulates them in several colorful ways. Aug 92

★★ **PowerTrax 1.1 (1.2)**, Soft Solutions, 404/457-9400, \$495. Convoluted and repetitive data-entry processes slow you down when they should speed you up in this 4D-based information-management system. Apr 92

★★★★ **RateFinder 1.5 (1.6)**, Elefant Software, 510/843-7725, \$99. Numerous interface violations don't change the fact that these all-inclusive shipping-rate tables make the old-fashioned chore of checking mail rates easier and more efficient. Jun 92

★★★★ **SpreadBase 1.0.1**, Objective Software, 415/306-7410, \$695. Powerful business data-analysis tool is a unique combination of database and spreadsheet functions. It's worth a close look for power users, despite meager documentation and a cranky macro language. May 93

★★★★ **ZP4 7 (10)**, Semaphore Corp., 408/688-9200, \$125. Clean up and standardize addresses with this CD ROM, thereby reducing postage costs and avoiding undeliverable mail; uses a licensed version of the U.S. Postal Service's official database of every valid postal address in America. May 92

COMMUNICATIONS/NETWORKS

★★★★ **A/UX 3.0**, Apple Computer, 408/996-1010, \$709. Hybrid-operating-system package implements the Stone Age, type-one-line-at-a-time text interface of Unix in a way a Macintosh user might actually like. Nov 92

★★★★ **AccessPC 2.0**, Insignia Solutions, 415/694-7600, \$99.95. Slick control over formatting multiple types of DOS media is the major advantage of this file-transfer utility. Oct 92

★★★ **Carbon Copy for the Mac 2.0 (2.04)**, Microcom, 919/490-1277, single-user \$99, multi-user \$299. Screen-sharing utility is convenient and economical for occasional use but because it competes

for RAM on attended low-memory Macs, it isn't efficient enough to use as a global solution for remote-control support. Apr 92

★★★★ **CompuServe Information Manager 2.0.1**, CompuServe, 614/457-8600, \$49.95. The goal of this product is to give friendlier information-access to CompuServe for Macintosh users. An appealing color interface and increased speed are signs of success, but there's still room for improvement. Dec 92

★★★★ **DataClub Classic**, DataClub Elite 2.0, Novell, 800/638-9273, \$175, \$1395. Fully distributed file servers allow users to pool the free space on their drives into one virtual server. File sharing is transparent, but when a participating Mac disconnects from the network, users lose access to files stored on its hard drive. Aug 92

★★★★ **DOS Mounter 3.0**, Dayna Communications, 801/531-0600, \$89.95. If you need to use wild cards in extension mapping, this file-transfer utility is the only option, although it's slower than other file-transfer programs. Oct 92

★★★★ **Macintosh PC Exchange 1.01**, Apple Computer, 408/996-1010, \$79. For basic file-transfer, this control panel device allowing cross-platform file sharing is fine, but it's hardly state-of-the-art. Oct 92

★★★★ **MicroPhone II 4.0 (4.0.2)**, Software Ventures Corp., 510/644-3232, \$295. Refinements are evident throughout this telecommunications software's upgrade, but not everyone needs \$295 worth of sophistication. The impressive scripting facility is countered by poor help features. Jul 92

★★★★ **MicroPhone Pro**, Software Ventures Corp., 510/644-3232, \$295. Truly comprehensive telecommunications package now includes send-and-receive fax software. Although the new TCP/IP tools are complicated, the documentation is clear and precise. Apr 93

★★★★ **NetMounter 1.00 (1.01)**, Dayna Communications, 801/531-0600, \$99. Reasonably priced utility provides Macs access to NetWare file servers without your having to install NetWare on the Macintosh on the server. It's not an ideal choice, but it is economical for mixed networks with only a few Macs. Sep 92

★★ **NetVirtual 2.0**, Eclectec, 408/462-2040, \$995, unlimited nodes \$4985. One-of-a-kind network-simulation product favors flexibility at the expense of usability. Only after hours of work will your simulation report anything meaningful about your network, and even then the results are difficult to analyze. Apr 93

✓ **NetWare for the Macintosh 3.011**, Novell, 800/638-9273, \$495-1995. NetWare 3.11, an expensive but robust network operating system, runs on a non-Mac dedicated server and is complex to manage. This set of NetWare Loadable Modules lets you add Macs to a NetWare network.

★★★★ **Network SuperVisor 2.0.1 (2.1)**, CSG Technologies, 412/471-7170, \$495. Fast and accurate data collection is the strong point of this network-management utility, but the interface isn't that intuitive. Aug 92

★★★★ **Network Vital Signs 1.0 (1.1)**, Dayna Communications, 801/531-0600, \$449. Fault-monitoring application continually watches selected network devices and services, monitoring specific equipment for specific errors. Unfortunately, when monitoring more than ten devices, it noticeably degrades the performance of the monitoring Mac. Mar 93

★★★★★ **NetWorks 1.0.1 (2.0), Caravelle Networks Corp., 613/596-2802, \$1195.** Become a network demigod with omnipresent capabilities over network devices using this network-management and paging utility. *Macworld's* network manager loved it, calling it versatile, flexible, and worth its weight in gold. Jun 92

★★ **Notify 1.0, Ex Machina, 718/965-0309, \$149.** Innovative wireless transmitter uses the Mac to send messages to pager. It's a start on a new technology, but the quirky product has a long way to go. Jun 92

★★★★★ **PacerForum 1.0.1, Pacer Software, 619/454-0565, \$549.** Any file server or underused networked Mac can host an online forum using this network bulletin board system. The well-designed graphical interface stands out, although the display looks better on color monitors. Jul 92

★★★★★ **RouterCheck 2.0, Neon Software, 510/283-9771, \$895.** Keep your finger on the pulse of router configurations and internet traffic with this network-administration utility. It's a must for midsize or larger internets, but too pricey for small networks. Oct 92

☐ **SoftPC 2.0 (2.5), Insignia Solutions, 415/694-7600, \$399.** A graceful implementation of the PC architecture on a Mac, this program emulates PC AT hardware through a powerful BIOS that remaps Intel 80286 addresses to a Motorola 68000-series CPU. The main drawback is slowness.

★★★★★ **Status Mac 2.0.2 (3.0), On Technology, 617/876-0900, \$449.** With less hassle for network managers and users, this upgrade invites customization in both the collecting and storing of information about networked Macs; users can even delay time-consuming profiling. May 92

★★★★★ **TechWorks Net Utilities 1.0, Technology Works, 512/794-8533, \$129.** Collection of five separate applications provides essential network-monitoring tools at a price that would please anyone. Dec 92

★★★★★ **Timbuktu 5.0.1, Farallon Computing, 510/814-5000, single user \$199, multiuser \$999 to \$5500.** By letting one computer (a Mac or a Windows-based PC) control, observe, or exchange data with another computer, this terminal-emulation product allows you to use resources almost anywhere on a network. Despite minor blemishes, such as its inability to cut and paste between Macs and Windows PCs, it's a clear winner. Mar 93

★★ **Vicom Terminal Emulators (4.2), Vicom Technology, 604/684-9517, \$195 to \$3500.** These bare-bones, British-designed terminal emulators lack many common U.S. modem configurations, but do support multiple simultaneous sessions. Aug 92

☐ **WhiteKnight 11 (11.14), The FreeSoft Company, 412/846-2700, \$139.** In the right hands, this product is the precision tool of communications software, but it does assume familiarity with telecommunications and with programming concepts.

DESKTOP PUBLISHING

★★★★★ **Aldus PageMaker 4.2, Aldus Corp., 206/628-2320, \$795.** Interruptible screen redraw is one of the dozens of enhancements that make this upgrade well worth its price. Even so, some of the features that users need the most—opening multiple documents, for instance—are still missing. May 92

★★ **Aldus Personal Press 2.0, Aldus Corp., 206/628-2320, \$199.** Basic, inexpensive page-layout program adds features and gains strength, but is still missing elements that novice users need, such as automatic kerning. Furthermore, its software-knows-best approach to copyfitting makes manual fine-tuning difficult and is almost certain to confuse and confound beginners. Mar 93

★★★★ **Apple Font Pack, Apple Computer, 408/996-1010, \$99.** Apple's first collection of TrueType fonts includes only 12 fonts that haven't been available since the late eighties in the PostScript format. Still, it's not a bad deal, considering that Adobe PostScript fonts cost four times as much. Mar 93

★★★★★ **Fontographer 3.5, Altsys Corp., 214/680-2060, \$495.** Versatile tools that enable you to edit PostScript typefaces or create your own are the highlight of this font-design software. But beware, some processes are technical and cumbersome. Nov 92

★★★★ **Lazy Dog Foundry Personal Font, Lazy Dog Foundry, 612/291-0306, \$199.99, full 180-character set \$499.99.** Type 1 font made from your handwriting has clean, even lines—whether or not your writing does. Apr 93

★★★★★ **LetraStudio 2.0, Letraset USA, 201/845-6100, \$249.** Precise, intuitive control over character spacing and shapes, as well as a straightforward interface, make this program a great choice for manipulating type, but it lacks flashy effects, such as gradient fills. Oct 92

★★ **MacQuill 1.0, Nest Software, 408/441-1944, \$99.95.** Friendly, inexpensive page-layout program is missing basic features, such as kerning and importing, and suffers from some bugs and deficiencies, but for simple word processing and grass-roots page layout it's serviceable. Aug 92

★★ **MenuFonts 4.03 (4.04), Dubl-Click Software, 818/888-2068, \$69.95.** A control panel device that groups type styles in families and displays font names in their own typefaces sounds like a great idea, and it would be if there were fewer incompatibilities. May 92

★★★★★ **Multiple Master Myriad 1.0, Adobe Systems, 415/961-4400, \$370.** Elegant execution and functional design combine in this two-axis Multiple Master typeface that exceeds all previous ideas of electronic font perfection. Jul 92

★★★★★ **Personal Font, Signature Software, 408/458-0241, \$179.95.** Turn your handwriting into a PostScript Level 3 or a TrueType font. The results are good, although not perfect—TrueType letters were not connected on screen, but this should be corrected with TrueType 2.0. Dec 92

★★★★★ **Publish It Easy 3.0, Timeworks, 708/559-1300, \$199.95.** Desktop-publishing program offers writing, editing, formatting, page-layout, drawing, and painting tools with well-thought-out interface innovations, plus an excellent database manager. Unfortunately, the program is unstable and crash-prone. Mar 93

★★★★★ **QuarkXPress 3.1, Quark, 800/788-7835, \$895.** Dozens of updated features and frustration-relievers in this upgrade include new palettes and preferences, better zooming, and improved text-editing and -formatting. The program, while still not perfectly behaved, is stable, well designed, and full-featured. Jul 92

★★★★★ **Renaissance 1.0, Eastman Kodak, 800/433-2839, \$695.** A strange mixture of power and oversight, this page-design and -layout software provides sev-

eral slick features, including handling multiple page sizes simultaneously, but blatantly ignores common Mac conventions, such as some keyboard shortcuts. Dec 92

★★★★★ **Spectacular 1.2, FontHaus, 203/846-3087, \$79.95.** Keep track of fonts efficiently and effectively with this type-specimen generator. Printing specimen sheets is a cinch. Jan 93

★★★★★ **SuperATM, Adobe Systems, 415/961-4400, \$149.** This upgrade to Adobe Type Manager lets you view Adobe-brand PostScript fonts on screen and output them at high resolutions, even when the corresponding printer fonts are unavailable. Although it has limitations, this is an outstanding advance in font technology and a tremendous value. May 93

EDUCATION

★★★★★ **Algebra, Broderbund Software, 415/382-4400, \$89.95, school edition \$99.95.** Interactive, imaginative math tutorial is keyed to the standard textbook order of topics, but offers much more. It is particularly strong on word problems and graphing. May 93

★★★★★ **American Discovery 3.0, Great Wave Software, 408/438-1990, \$49.95.** Without glitzy graphics or sound, this educational game, intended mainly for classroom use, provides an excellent drill in geography, state capitals, and state facts. May 92

★★★ **The Castle of Dr. Brain 1.0, Sierra On-Line, 209/683-4468, \$49.95.** After applying for a job as a lab assistant with the local mad scientist, you must use logic and raw brain-power to navigate a series of rooms, mazes, and hallways on the way to your interview. Puzzles range from simple and mundane to creatively laborious. Dec 92

★★★ **Comprehensive Review in Biology, Queue, 203/335-0908, \$295.** There isn't a textbook publisher in North America with the nerve to publish a black-and-white biology book with nothing more than text and basic line drawings, much less charge several hundred dollars for it, but that, in effect, is what this CD ROM is. May 93

★★★★★ **Compton's Multimedia Encyclopedia 1.00M, Compton's New Media, 619/929-2626, \$795.** The down-to-earth writing style and numerous bells and whistles of this multimedia encyclopedia on CD ROM appeal to younger readers, but the high cost and sluggish performance may be prohibitive. Apr 93

★★★★★ **Eco-Adventures in the Ocean, Eco-Adventures in the Rainforest 1.0, Chariot Software Group, 619/298-0202, \$59.95.** Explore the ocean or rainforest while avoiding pitfalls and predators in these educational adventure games. Imaginary landscapes that combine features found in different environments may confuse some students. Nov 92

★★★★★ **Headline Harry and the Great Paper Race 1.0, Davidson & Associates, 310/793-0600, \$59.95.** Travel through time and across the country as a journalist in this history/geography game. While not an educational masterpiece, it is lots of fun. Dec 92

★★★★★ **MacGlobe 1.3.0, Broderbund Software, 415/382-4400, \$59.95.** Besides maps and bits of fun, such as national anthems, this geography software offers an impressive quantity of demographic and economic information. While it could stand some improvement in data export, it provides a fascinating intellectual adventure for *continues*

Star Ratings

home and school use. Feb 93

★★ **Math Shop, Math Shop Jr., Advanced Math Shop 1.0, Scholastic, 800/541-5513, \$24.95.** The humdrum workbook format is converted into bits and bytes with these mathematics education games. May 92

★★★★ **The New Grolier Multimedia Encyclopedia, Grolier Electronic Publishing, 203/797-3530, \$395.** The remarkably current and scholarly text of this encyclopedia on CD ROM is suitable for sophisticated readers, while its speed, ease of use, and value are impressive. Apr 93

★★ **NihongoWare, Vol. 1, Qualitas Trading Company, 510/848-8080, \$623.** Although this Japanese language CD ROM offers solid instruction, it's so expensive and so limited in its word selection that it's not an economical choice for individual users. Jan 93

★★★★ **Number Munchers 1.1 (1.2), MECC, 612/569-1500, \$29.95 to \$69.** Fun, educational game builds arithmetic skills through arcade action. Munchers gobble your choice of multiples, factors, primes, equalities, and inequalities, but the game can't accept custom data sets. Jun 92

★★ **Picture It 1.0 (1.4), Penton Overseas, 619/431-0060, \$69.95.** If you add custom word lists, this interactive French-English picture dictionary may serve as a decent aid to a more complete curriculum, but it's buggy and of uneven quality. Aug 92

★★ **The Secret Codes of C.Y.P.H.E.R. 1.0 (1.1), Tanager Software Productions, 510/430-0900, \$59.95.** Intriguing facts about mammals and a variety of alphabets provide the interest in this educational game, but the inescapable, repetitive animations are a major distraction. Apr 93

★★★★ **StudyWare for the SAT 3.7N (4.0), Cliffs Notes, 402/423-5050, \$49.95.** Four full SATs, a TSWE (Test of Standard Written English), and a series of drills are included with this inexpensive SAT-training program. It doesn't provide a lot of tutorial assistance, but may be appropriate for students who need a quick brushup. Jun 92

★★★★ **Super Munchers 1.0, MECC, 612/569-1500, \$49.95 to \$69.** From a kid's point of view, this educational arcade game offers long-lasting appeal. The player maneuvers a cartoon Muncher around a game board, gobbling up words that fit target rules, such as Romantic composers or European countries. Jun 92

★★★ **Time Treks 1.0, Earthquest, 415/321-5838, \$59.95.** An eccentric archaeologist opens portals through time, and you must close them in this educational, HyperCard-based game. Slow response time and limited animation and color are somewhat disappointing, but overall it's a fun way to browse through history. Sep 92

★★★★ **Transparent Language 1.04M, Transparent Language, 603/465-2230, \$139.** Without an iota of glitz or glamour (no sound, graphics, color, or buttons), this foreign-language reader is a superb tool for bolstering language skills through reading. Oct 92

★★★★ **Where in America's Past Is Carmen Sandiego?, Broderbund Software, 415/382-4400, \$44.95.** Travel through time and the United States while chasing those V.I.L.E. crooks in this clever educational history/geography game that's challenging for all ages. Mar 93

★★★★ **Where in the World Is Carmen**

Sandiego? Deluxe Edition, Broderbund Software, 415/382-4400, \$79.95. The V.I.L.E. gang is at it again, stealing famous objects and fleeing to locations around the world. In this deluxe version of the well-known geography game, there are more crooks, more clues, and more countries to visit. Oct 92

★★★★ **Word Munchers 1.0 (1.2), MECC, 612/569-1500, \$29.95 to \$69.** Munch the words with matching vowel sounds in this educational game for grades 1 to 5+. Dazzling color graphics stand out, but the repetitive cartoon sequences get tiresome. Jun 92

★★★ **World Atlas 1.2, Software Toolworks, 415/883-3000, \$79.95.** Extensive, detailed maps of countries and regions are the highlight of this atlas software. In addition, descriptive headings report interesting text-based demographic data. Apr 92

ENTERTAINMENT

★★★★ **4-D Boxing 1.0, Electronic Arts, 415/571-7171, \$49.95.** Authentic motion and multiple viewing angles are the best features of this entertaining boxing game, but off-disk copy protection, geometric figures, and the inability to save games in progress make it less enticing. Sep 92

★★★★ **A-Train, Maxis, 510/254-9700, \$69.95.** Charming railroad simulation offers astonishing, and often witty detail, but the learning curve is high and the interface isn't completely Mac-like. Apr 93

★★ **America Alive, MediaAlive/CD Technology, 408/752-8500, \$99.** QuickTime movies, color photographs and maps, text, and audio mingle in this multimedia CD ROM guide to the United States. It's a promising concept, but it doesn't yield much useful information. Mar 93

★★★★ **Arthur's Teacher Trouble, Broderbund Software, 415/382-4400, \$59.95.** Every page of this delightful animated book is dense with surprises that arouse and satisfy a child's curiosity. In the words of six-year-old Alex, "It's like chocolate ice cream. You can have it more than once and it's still good." Apr 93

★★★ **Audioshop 1.0 (1.03), Opcode Systems, 415/856-3333, \$89.95.** Audiophiles will get a kick out of applying sound effects to any sound file on their Macs. You can also control the order of songs or sounds on an audio CD played on a CD ROM player. A number of quirks may confuse new users. Sep 92

★★★ **Battle Enhanced Chess CD ROM, Interplay Productions, 714/553-6678, \$79.95.** Elaborately detailed cartoon characters act out little dramas of strategy and capture, complete with sound effects, in this chess game that will drive nine-year-olds mad with glee but may annoy experienced chess players. Mar 93

★★★ **The Battle of Britain, Deadly Games, 215/295-2284, \$54.95.** It's August 10, 1940. The badly outnumbered British must defend their country against the invading Luftwaffe, and you're in charge. Although the graphics and sound are not spectacular, this is an entertaining, thinking person's game. Dec 92

★★★ **Blade 1.1 (2.0), Leviathan Corp., 313/826-3560, \$99.95.** Surreal graphics in this fantasy martial-arts game are spectacular—a cross between Dali and Seuss—but the arcade action is extremely difficult to master. Sep 92

★★★ **Capitalist Pig 1.0 (1.02), Pluma Soft-**

ware, 602/969-9441, \$59.95. Terrorist attacks, embezzlement, fires—keeping a cool head is half the challenge if you are to become successful in this business-simulation game. No clear end point means that getting rich, retiring, and writing novels is not an option. Sep 92

★★★★ **Cogito 1.0, Inline Design, 203/435-4995, \$59.95.** Rubik's Cube fans will like this challenging game where the goal is to replicate a pattern by moving rows and columns of tiles. The deviously simple twist is that clicking on the arrows that control movement results in reactions that are more and more complex as you progress through the 120 levels. Apr 93

★★★ **The Complete Annotated Alice 1.0, The Voyager Company, 310/451-1383, \$19.95.** Fans of *Alice's Adventures in Wonderland* will love the "lost" out-of-print chapter in this HyperCard book designed primarily for PowerBook users. As literary hypertext hide-and-seek, it works. Jun 92

★★ **Creepy Castle 1.0, Reactor, 312/573-0800, \$49.95.** Wolfman, the Bride of Frankenstein, and other ghouls from classic horror movies populate this clever arcade-style game. Still, delightful movie trivia doesn't compensate for frustrating performance delays and limited scenarios. Jun 92

★★★★ **Cross Country 1.0 (2.0), T-34 Microsystems, 904/396-2785, \$179.95.** No unnecessary frills complicate this efficient, inexpensive instrument-flight trainer. It doesn't have a true aerodynamic feel, but that flaw's not critical. Jul 92

★★★★ **Cyberblast 2.01, Innerprise Software, 410/560-2434, \$49.95.** Aliens have overrun the 64 levels of Fastrax Labs, and it's your job to get rid of them in this arcade game. While it's not the most unusual game in the universe, it's a nice, basic shoot-'em-up, with clever execution and appealing graphics. Sep 92

★★★★ **Go Master 5, Toyogo, 808/396-5526, \$69.** Go has been called the most interesting board game ever invented. This excellent software version incorporates helpful learning aids and sample games. Dec 92

★★★★ **HardBall II, Accolade, 408/985-1700, \$54.95.** From the pitcher's windup to the batter's swing, this baseball game comes astonishingly close to natural human motion. The upgrade adds more teams, more stadiums, instant replay, and the ability to create your own league. May 92

★★★★ **HELLCATS Over the Pacific 1.0.3, Graphic Simulations, 214/699-7400, \$69.95.** Fly a WWII-era Navy fighter, the Grumman F6F Hellcat, against enemy planes in the South Pacific with this flight simulator that offers smooth graphics, good special effects, and great documentation. Apr 93

★★★★ **Insanity 1.0, UV Wave, 318/868-9944, \$28.95.** Shoot your Mac with this cool control panel device that offers a choice of nine weapons, ranging from an Uzi to a pigeon. It has first-rate sound effects and detailed animation, but the novelty wears off. Feb 93

★★★★ **Just Grandma and Me, Broderbund Software, 415/382-4400, \$49.95.** Mercer Mayer's Little Critter comes to life in this charming, captivating, wondrously entertaining, interactive storybook on CD ROM. Aug 92

☑ **Kid Pix 1.0 (1.2), Broderbund Software, 415/382-4400, \$59.95.** An entrancing, enchanting color paint program aimed at children but delightful for grown-ups, too. Hilarious sounds, hidden surprises, spectacular

effects, zany and creative tools—it's a classic.

★★★ **Kid Pix Companion, Broderbund Software, 415/382-4400, \$39.95.** Addition to Kid Pix adds clever new features, including the world's easiest-to-use QuickTime movie and presentation modules, but it's less appealing than the delightfully simple original. Oct 92

★★★★ **Monkey Island 2: LeChuck's Revenge, LucasArts Games, 415/721-3394, \$59.95.** This whimsical Twilight Zone of life on the high seas is the adventure-game equivalent of *Mad* magazine, filled with witheringly sarcastic dialogue, splendid gross-out jokes, heapings of self-parody, and enough hilarious detail to keep you amused for days. May 93

★★★ **Mozart: The "Dissonant" Quartet, The Voyager Company, 310/451-1383, \$59.95.** This CD ROM includes an unusual essay on the anatomy of stringed instruments, brief discussions of general musical concepts, an analytical overview of the quartet, and a taped mini lecture on Mozart's life, but sadly enough the music is limited almost entirely to the title piece. Apr 93

★★★ **Nobunaga's Ambition 1.0, Koei Corp., 415/348-0200, \$59.95.** Visit the Warring States period of feudal Japan, unify the country, and usher in an era of peace. Strategy game is absorbing and challenging, but the interface can be annoying. Jun 92

★★ **The Orchestra: The Instruments Revealed, Warner New Media, 818/955-9999, \$79.98.** The many-branched, interwoven hypertext style of this music-education CD ROM makes the program hard to navigate and digest, despite its richness. For the price, other music-education CD ROMs present better values. Apr 93

★★★★ **Patton Strikes Back: The Battle of the Bulge, Broderbund Software, 415/382-4400, \$19.95.** Military simulation game with superior graphics is simple to learn and satisfyingly complex. If only they'd skipped the off-disk copy protection. Jun 92

★★★★ **Poetry in Motion, The Voyager Company, 310/451-1383, \$29.95.** Performance videos of contemporary poets are juxtaposed with the texts of their poems and taped interviews in this intriguing CD ROM that combines the excitement of the stage with the reflective appeal of the page. Feb 93

★★★★ **Prince of Persia, Broderbund Software, 415/382-4400, \$49.95.** A high tolerance for frustration is necessary to negotiate the 12 mazelike levels of dungeon and palace in this arcade adventure, but amazingly realistic (although gory) animation, stunning graphics, and entertaining challenges make it all worthwhile. Sep 92

★★★ **Red Baron 1.0, Dynamix, 800/326-6654, \$69.95.** The romance of history and the realism of a flight simulator combine in this World War I flight game. Despite small annoyances, including too many dialog boxes to get to the simulation, this game will charm any aspiring ace. Nov 92

★★★★ **Richard Strauss: Three Tone Poems, The Voyager Company, 310/451-1383, \$59.95.** *Don Juan*, *Till Eulenspiegel*, and *Death and Transfiguration* are the three works included in this CD ROM, with a program written by Russell Steinberg. The musical analysis is satisfying and the lush orchestral music will appeal to both novice and experienced classical music listeners. Apr 93

★★★ **Rodney's Wonder Window, The Voyager Company, 310/461-1383, \$39.95.** Collection of 23 colorful, wacky graphics and animations by Rodney

Alan Greenblat is charming but uneven. The overall look is surreal and cartoonish, but while some modules are elaborate and sophisticated, others are simple and not particularly interesting. Mar 93

★★★ **Schubert: "The Trout" Quintet, The Voyager Company, 310/451-1383, \$59.95.** Alan Rich, classical music commentator for National Public Radio, conveys his enthusiasm for this appealing music in the lively text of this CD ROM. However, the discussion is relatively unchallenging and the musical performance, though well regarded, is not at the top of most reviewers' lists. Apr 93

★★★★ **The Secret of Monkey Island 1.0, LucasArts Games, 415/721-3300, \$59.95.** A genuinely amusing, interactive tale of swashbuckling and daring deeds using splendid 256-color graphics and an original soundtrack. Low screen resolution and irksome copy protection only slightly spoil the delight. Sep 92

★★★★ **Shanghai II: The Dragon's Eye, Activision, 310/207-4500, \$49.95.** Classic tile game is more addictive than ever; flashy enhancements include new tiles and layouts, plus an additional, entirely new game that's a variation on the tile-removal theme. May 92

★★ **Sherlock Holmes, Consulting Detective 1.0, Icom Simulations, 708/520-4440, \$69.95.** Accompany Sherlock Holmes and Watson as they investigate three CD ROM-based mysteries. Primarily made up of video scenes, this game's only slightly more interactive than TV, and the picture's not as good. Aug 92

★★★★ **Sherlock Holmes, Consulting Detective, Volume II, Icom Simulations, 708/520-4440, \$69.95.** Match wits with the legendary detective by solving three difficult mysteries in this game on CD ROM. May 93

★★★★ **A Silly Noisy House 1.0, The Voyager Company, 310/451-1383, \$59.95.** A brightly colored animated world awaits exploration; this CD ROM's simple scenes and syrupy songs are perfect for preschoolers. May 92

★★★★ **SimAnt 1.0, Maxis, 510/254-9700, \$59.95.** Marauding red ants, ant lions, spiders, even power mowers—an ant's life is likely to be short in this remarkably detailed simulation game in which the object is to have black ants amass territory in a suburban backyard. Apr 92

★★★ **SimLife, Maxis, 510/254-9700, \$69.95.** A megalomaniac's dream come true, this amazingly intricate simulation game allows players to create and control ecosystems. It's not easy, but the reward is an increased understanding of the complex interrelationships of life. Feb 93

★★★★ **So I've Heard, Volume 1: Bach and Before, The Voyager Company, 310/451-1383, \$24.95.** Engaging text by classical-music critic and lecturer Alan Rich describes nearly two millennia of western music (up to the mid-eighteenth century) in this CD ROM. It offers a unique and affordable opportunity to sample 50 or so performances, styles, and compositions. Feb 93

★★★ **Space Quest 1: Roger Wilco in the Sarien Encounter, Sierra Online, 209/683-8989, \$29.95.** As Roger Wilco, starship janitor, you must defeat the evil Sariens in this adventure game where your head is more important than your hands. Puzzles range from the obvious to the head-scratching, but for most players the game will be easy to complete. Apr 93

★★★★ **Spaceward Ho 2.0.1, Delta Tao Soft-**

ware, 408/730-9336, \$59. A happy planet is a profitable planet in this absorbing, humorous strategy game of interstellar capitalism and imperialism. Aug 92

★★★★ **Spectre 1.0, Velocity Development Corp., 415/776-8000, \$59.95.** Fight enemy tanks in a 3-D arcade game that is at once basic and extremely addictive. When installed on a network, it's one of the great antiproduktivity tools of all time. May 92

★★★★ **Spelunx and the Caves of Mr. Seudo, Broderbund Software, 415/382-4400, \$49.95.** Unanticipated giggles, rich graphics, entertaining sounds, and creative learning activities fill this interactive hyperworld. We recommend it, despite its tiny bugs. Jul 92

★★★ **Super Mines 1.0, Callisto Corp., 508/655-0707, \$49.95.** You use logic to search a minefield without setting off the mines in this fast-paced game that's easy to learn, but offers 84 levels for long playability. Apr 93

★★★★ **Super Tetris, Spectrum HoloByte, 510/522-3584, \$49.95.** Teensy tiles are a very minor negative in this exceptional tile game that's more varied, more challenging, and more forgiving than the original. Oct 92

★★ **Surgeon 3, The Brain 1.0 (1.1), ISM, 410/560-0973, \$59.95.** Surgical-simulation game with realistic graphics and sound can be entertaining and educational, but it's overly intolerant of mistakes—not for the faint of heart or the easily frustrated. Sep 92

★★★★ **Warlords, Strategic Studies Group, 904/494-9373, \$59.95.** A medieval fantasy world is the setting for this colorful game of strategy and conquest with beautiful graphics. Unfortunately, the computer opponents are not challenging enough for an experienced war-gamer, although human opponents may be. Dec 92

★★★★ **Who Killed Sam Rupert, Creative Multimedia Corp., 503/241-4351, \$39.99.** You're a police detective trying to solve the murder of a popular restaurateur in this interactive CD ROM that exploits the full range of multimedia options and provides a wealth of clues and surprises to hold your interest. May 93

★★★★ **Wordtris, Spectrum HoloByte, 510/522-3584, \$49.95.** Tetris's falling blocks are letters in an arcade game for Scrabble lovers. Lots of variations, including modes for children, tournaments, and head-to-head play on a network, make it a super game. Jun 92

GRAPHICS

★★★★ **Adobe Dimensions, Adobe Systems, 415/961-4400, \$199.** This three-dimensional-effects utility may seem very limited, with white-only light and no surface texturing, but it's a ground-breaking product. It performs its 3-D illusions within the object-oriented, resolution-independent world of PostScript and is an excellent tool for anyone who works extensively in Adobe Illustrator or Aldus FreeHand. Apr 93

☑ **Adobe Illustrator 3.01, Adobe Systems, 415/961-4400, \$695.** Adept transformation and reshaping capabilities and superb text-handling stand out in this object-oriented illustration program. It also includes features found in no other Macintosh draw program, such as tools to create line and bar graphs.

★★★★ **Aldus FreeHand 3.1 (3.11), Aldus Corp., 206/628-2320, \$595.** A pressure-sensitive freehand continues

Star Ratings

tool is the most remarkable new feature of this updated drawing program. Substitution for missing fonts is another good addition, but skimpy text-editing tools and incomplete support for EPS continue to diminish its value. **Jun 92**
★★ Aldus Gallery Effects 1.0 (1.5), Aldus Corp., 206/628-2320, \$199. Uninspiring collection of 16 image-editing filters has an unusually strong manual. **Apr 92**

★★★ Alias Sketch 1.0.2 (1.5), Alias Research, 800/447-2542, \$995. The unique collection of tools makes this the only program that allows you to sit down and play with 3-D rendering. Failings include quirky navigation and sluggish performance. **Aug 92**

★★★★ ArchiCAD 4.02 (4.1), Graphisoft USA, 415/737-8665, \$4450. The simple yet powerful 3-D interface in this CAD package builds on a construction metaphor. The integrated product incorporates most of the features an architect needs. **Jun 92**

★★ ArtBeat Professional 1.0, Pie Practical Solutions, 201/902-9500, \$249. Despite a smattering of unique capabilities, this inexpensive draw and paint program lacks many of the features of equivalent programs. **Apr 93**

★★★ AutoCAD Release 11, Autodesk, 415/332-2344, \$3500. Customizable, bare-bones drafting upgrade partially implements a graphical user interface. Few add-ons are currently available. **Dec 92**

★★★★ CA-CricketDraw III 1.0, Computer Associates International, 408/432-1727, \$249. Although not revolutionary, this draw program boasts some original implementations, including dramatically improved gradations. **May 92**

★★★ Cachet 1.0, Electronics for Imaging, 415/742-3400, \$595. The tools, interface, output, and documentation of this color-image editor are all quite impressive for a first version, but serious failings include slowness and disappointing sharpening. **Dec 92**

☑ **Canvas 3.0 (3.0.6), Deneba Software, 305/596-5644, \$399.** Discovering the complex nuances of this draw program's immense feature list isn't easy, but it's well worth the effort. The precision drawing functions in particular should appeal to many users.

☑ **Claris CAD, Claris Corp., 408/727-8227, \$899.** Serious but basic CAD package has fallen behind the competition after a long period without an upgrade. Still, it's one of the fastest products available for scrolling and zooming—important for work on large, complex drawings.

★★★★ Color It 2.0.1, Timeworks, 708/559-1300, \$299.95. Overpriced color paint program has a full range of painting and image-retouching capabilities, including 15 levels of undo and an impressive magic-wand tool, but its naming conventions are bewildering. **Apr 93**

★★ CPM Graphic Tutor 1 & 2, Caseys' Page Mill, 303/220-1463, \$489 per volume. Although some neophytes may find these CD ROM tutorials on Adobe Illustrator and Adobe Photoshop helpful, the programs' distracting interfaces, inconsistent execution, lack of polish, and high price weigh strongly against them. **May 93**

★★★★ DesignCAD 2D/3D 3.0.1, DesignCAD, 918/825-4848, \$299.95. Despite slow rendering, this general-purpose 3-D modeler with 2-D drafting capabilities represents a price and performance breakthrough in 3-D modeling programs. **Nov 92**

★★★★ ElectricImage Animation System

1.5.1, Electric Image, 818/577-1627, \$7495. The most powerful animation program for the Mac improves its documentation and rendering, and adds an intuitive project window that allows you to control all aspects of animation from a single location. Unfortunately, it still retails for the price of a European vacation for two. **Feb 93**

★★★★ Expert Color Paint 1.0, Expert Software, 305/567-9990, \$49.95. A wonderful value for novices, this color paint program offers a tidy collection of features for an astonishingly low price. Beware of low memory settings, though, or it gets buggy. **Jun 92**

★★★★ Fractal Design Painter 1.2 (2.0), Fractal Design Corp., 408/688-8800, \$349. An expanded collection of paper textures and four new watercolor brushes add appeal to an already strong set of painting tools. Minor complaints include unsophisticated gradation and fill capabilities and an insensitive Undo command. **Aug 92**

★★ Image Assistant 1.0, Caere Corp., 408/395-7000, \$495. Besides unsatisfactorily addressing Adobe Photoshop's small list of liabilities, this image-editing software is barely able to keep up with less expensive bitmap editors. Problems include an unforgivable lack of antialiased text, no selective revert function, and an incorrectly implemented smudge tool. **Apr 93**

★★★★ Infini-D 2.0 (2.5), Specular International, 413/549-7600, \$995. Rich combination of 3-D modeling, rendering, and animation tools at a relatively affordable price. Visualization program works well, offers a nicely integrated approach to rendering, and is generally stable. **Jan 93**

★★★★ IntelliDraw 1.0, Aldus Corp., 206/628-2320, \$299. Crowd-pleasing features such as physical and dynamic links make this automated draw program a great environment for planning and presenting, although it's less satisfying as a free-form drawing tool. **Nov 92**

★★★★ Kai's PowerTools Volume 1 1.0, HSC Software, 310/392-8441, \$149. Photoshop plug-ins include image-editing filters; texture, gradient, and fractal generators; and special-effects tools. Although at times monstrously complicated, this collection represents a virtually infinite supply of visual resources. It's an amazing tool that no regular user of Photoshop should be without. **May 93**

☑ **MacDraw Pro 1.0v1 (1.5), Claris Corp., 408/727-8227, \$399.** The shallow array of integrated features in this draw program is perfect for the new or moderately experienced user, but compared with other programs in the same price range, it's slow and deficient.

☑ **MacPaint 2.0, Claris Corp., 408/727-8227, \$125.** Easy-to-use black-and-white paint program takes up very little RAM, but it adds few capabilities beyond those it offered eight years ago.

☑ **MacRenderMan 1.0 (1.3), Pixar, 510/236-4000, \$695.** This dedicated renderer provides an extremely sophisticated, albeit sometimes difficult, way to generate 3-D images. Currently the most widespread rendering scheme, it uses algorithms to create textures, bumps, lights, fog, and practically every other element of an image.

★★★★ MiniCAD+ 4, Graphsoft, 410/461-9488, \$795. Professionals should be delighted with this highly competent CAD package's evolution into 3-D. It has maintained its features-champion status and is easier to use. **Mar 93**

★★★★ Paint It 1.0, Timeworks, 708/559-

1300, \$59.95. Straightforward color paint program lacks image-editing tools but has a versatile cast of selection and painting tools—and it's priced to sell. **Apr 93**

★★★★ Ray Dream Designer 2.02 (2.04), Ray Dream, 415/960-0765, \$895. Experienced 3-D aficionados will find this 3-D-imaging software a welcome addition to their arsenal, and beginners may find it ideal for the leap from two dimensions to three. Improved text-handling and viewing capabilities would make it even better. **Sep 92**

★★★★ ScanMatch 1.01 (2.0), Savitar, 415/243-3030, \$199. Basically half a color-calibration system. Software quickly and easily adjusts color scan files for screen display, with somewhat uneven results; those wishing to adjust images for print purposes need to use another application. **May 92**

★★★★ Showplace 1.1 (1.1.1), Pixar, 510/236-4000, \$695. Straightforward graphics application organizes shading and rendering processes into five basic components. Beginners will like the simple interface, but the feature set is small for experienced users. **Jun 92**

★★★★ Sketcher, Fractal Design, 408/688-8800, \$149. A variety of effects reproduce the styles and techniques of traditional drawing tools with this wonderful gray-scale paint and image processing program. **Feb 93**

★★★★ Smoothie 1.02, Peirce Software, 408/244-6554, \$149. Create smoother screen images with this handy utility that antialiases the edges of on-screen artwork. Although it can't accommodate sound or accept imported QuickTime movies, it's a must for anyone who uses a Mac for presentations. **Nov 92**

★★ StrataType 3d 1.0, Strata, 801/628-5218, \$295. The rulers, texture palette, custom bevels, and canned positioning schemes of this 3-D type-effects software are nice, but they can't compare with the animation skills, single-character positioning features, lighting capabilities, and superb rendering of other available programs. **Mar 93**

☑ **Swivel 3D Professional 1.0 (2.0), Macromedia, 415/252-2000, \$695.** Relatively unusual cross-sectional technique makes this 3-D modeler a great tool, especially for fast prototyping. It provides a quick and easy way to create a variety of shapes.

★★★★ Tree, Onyx Computing, 617/876-3876, \$295. Single-purpose program generates lifelike color drawings of trees from a number of easily controlled parameters. Although visually appealing, it's an expensive way to draw a tree. **May 93**

★★★★ Typestry 1.0 (1.1), Pixar, 510/236-4000, \$299. Type enters the third dimension with this reasonably priced 3-D typographic effects and animation program. There's room for improvement, but it's an exciting tool for designers, multimedia producers, and those who enjoy working with type. **Nov 92**

☑ **TypeStyler (2.0), Braderbund Software, 415/382-4400, \$219.95.** The 35 shapes of this product's library let you reshape PostScript or TrueType fonts to create decorative special effects such as arches and perspective. TypeStyler turns fonts into graphics, enabling you to stretch, compress, or rotate text, as well as add colors, grays, or patterns.

★★ Zeus 0.91 (0.92), Delta Tao Software, 408/730-9336, \$499. Color paint program tries hard to match capabilities found in more expensive programs, *continues*

There are two ways to get 600 dpi on a LaserWriter



1) Buy a new one

If the recent printer introductions have made you feel like you and your old printer have been left behind, there is good news. You don't have to trash your old printer to get the latest in print technology, like 600 x 600 dpi. Xante offers upgrades that will turn your existing LaserWriter® or HP® LaserJet® into a 600 dpi, high performance, PostScript® compatible printer.

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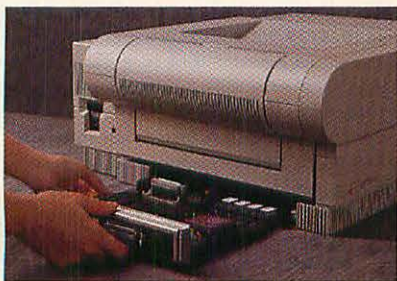
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SCSI	✕	✓	
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Circle 1 on reader service card

Star Ratings

but not always successfully. It's brimming with good ideas that are poorly implemented. Aug 92

MATH/SCIENCE

★★★★ **Caduceus Physics 1.0, Scientia, 617/776-3427, \$159.95.** Giant HyperCard stack consists of carefully indexed cards covering small conceptual bites of physics; it's the first in a series of programs designed to prepare students for the Medical College Admissions Test (MCAT). Jan 93

★★★★ **Data Desk 4.0, Data Description, 607/257-1000, \$595.** For finding patterns in data, this statistical-analysis program has no peer. Years of refinement have made it a unique, and uniquely valuable, tool for analysis, despite its lack of some tests found in larger programs. May 93

★★★★ **Entrypaq 3.0, Albathion Software, 415/824-2737, \$149.95.** Low-end expert-systems shell is an excellent teaching tool, but the slow performance and HyperCard interface rule it out for practical implementation. Nov 92

★★★★ **Expert Astronomer 1.0, Expert Software, 305/567-9990, \$49.95.** Draw maps of the sky from any location in the Solar System and learn about celestial objects with this astronomy software. Most effective in color, this is a great educational tool for beginners and a reference database for experts. Dec 92

★★★★ **Expressionist 3.0, Prescience Corp., 415/543-2252, \$199.95.** If you work regularly on similar topics, you can customize this equation-writing software so that it produces equations with exactly the appearance you want, letting you work at amazing speed. Mar 93

★★★★ **HiQ 1.0 (2.0), Bimillennium Corp., 408/866-2010, \$695.** A script language, which exhibits an endearing nonchalance about data structures and typing of variables, is only one of the impressive features of this formidable numerical mathematics software. Oct 92

★★★★ **Interactive Physics II 1.0 (1.01), Knowledge Revolution, 415/553-8153, \$399.** Motion simulation software is an improvement over traditional classroom instruction in physics. This new version greatly expands the range of problems that can be solved, and adds support for QuickTime. Dec 92

☐ **JMP 2.0 (2.05), SAS Institute, 919/677-8000, \$695.** You get lots of value for your money with this statistical-analysis program and its vast assortment of functions, including strong classical statistics and visualizations, 3-D spin features, quality-control statistics, and a manual that is a model of concise clarity.

★★★★ **MacBreadboard 1.1, Yoeric Software, 919/644-1620, \$59.95.** Useful educational engineering software simulates with excruciating detail every aspect of a digital integrated-circuit breadboard trainer. It accurately replicates and even surpasses the behavior of a physical breadboard—without burning out IC chips. Dec 92

★★★★ **MacPhase 1.2, Otter Solutions, 315/768-3956, \$159.** Low-cost, scientific-data-visualization software with a large assortment of mathematical tools is one of the few authentic bargains in science software. One of its principal strengths is a well-planned color lookup table editor that's delightfully easy to use. May 93

★★★★ **Maple V, Brooks/Cole Publishing, 800/354-9706, \$450.** For functional scope and ease of use on a basic Mac (such as a Classic or Plus), this sym-

bolic math software has no competitors. May 92

☐ **Mathematica 2.0 (2.1), Wolfram Research, 217/398-0700, \$595.** While its memory demands are high, this symbolic-math program offers a truly vast array of functions, including over 800 numerical and symbolic routines. The quality and quantity of its support literature are outstanding.

★★★★ **MathType 3.0, Design Science, 310/433-0685, \$199.** This equation-writing software makes automatic typographical decisions, which is helpful if you produce documents on a wide range of subjects. Its smooth integration with Microsoft Word is also convenient. Mar 93

★★★★ **Minitab 8.2, Minitab, 814/238-3280, \$695.** These statistical-analysis tools are broad but not exhaustive. Still, they're easy to learn and easy to use, making Minitab an excellent teaching tool. The graphics and output are unfortunately typewriter-like. Jun 92

★★ **NueX 1.1 (1.3), Charles River Analytics, 617/491-3474, \$295.** Lightweight introduction to artificial neural networks and knowledge-based expert systems has some merit, but cannot be considered a serious production tool. Oct 92

★★★★ **Sequencher 2.0, Gene Codes Corp., 313/769-7249, \$2200.** While not implementing everything a DNA researcher could want, this software for manipulating DNA-sequence information does provide the things a researcher really needs. The single best feature is its raw speed. Dec 92

★★★★ **SigmaPlot for the Macintosh 4.11, Jandel Scientific, 415/924-8640, \$495.** It's a short path from raw data to publishable graphs with this scientific graphing software. The Mac fundamentals need polish, but the program offers unique analytic capabilities. Jul 92

★★★★ **Simulink 1.2, The MathWorks, 508/653-1415, \$3995.** If you hear the word *Bode-plot* several times a week at work, this math-simulation software is designed to make your life wonderful. Little glitches and a command-line orientation are drawbacks. Dec 92

★★★★ **StatView 4.0m, Abacus Concepts, 510/540-1949, \$595.** A nice mix of statistical prowess and operating convenience distinguish this statistical-analysis and presentation software. The printing options are outstanding. Nov 92

★★★★ **TeMath 1.0, Brooks/Cole Publishing, 800/354-9706, \$39.95.** For roughly the price of a textbook, this mathematical-exploration software provides all the help a student needs to understand what's really happening in differential and integral calculus. Apr 92

★★★★ **Theorist 1.5, Prescience Corp., 415/543-2252, \$449.95.** Symbolic-mathematics program that you can figure out by yourself adds a useful table feature, more special functions of physics, and better graphics. Plus, it's still the only program to use real notation directly. May 93

ORGANIZATION/PRODUCTIVITY

★★ **ACT 1.0, Contact Software International, 214/919-9500, \$395.** While this contact manager has several laudable features, such as customizable contact views and an integrated word processor, learning how to use it is a frustrating experience. Feb 93

★★★★ **Active Memory 2.0, ASD Software, 714/624-2594, \$199.** Personal organizer distinguishes it-

self by providing strong network support, although it may be overkill for a lone user. Aug 92

★★★★ **Agent DA 2.0 (2.1.1), TeamBuilding Technologies, 514/278-3010, \$129.** Simple, flexible calendar/reminder program includes every obvious calendar function—easy navigation, extensive print options, adjustable displays, recurring events, and even a straightforward manual. Sep 92

★★★★ **Amaze Daily Planners: Cathy, The Far Side, Word-A-Day (2.0/1993), Amaze, 206/820-7007, \$59.95.** A cartoon (or word) a day makes scheduling more fun with these icon-based calendar/daily planners, but the graphics take up a lot of hard drive space, and the programs must be running in order for alarms to sound. Sep 92

★★ **Connections 2.1, Concentrix Technology, 415/358-8600, \$199.** A wider range of scheduling features, new printing options, and improved networking capabilities don't change the fact that this HyperCard-based personal information manager is just too slow. Nov 92

★★★★ **DateBook 1.5.1, After Hours Software, 818/780-2220, \$125.** Personal time manager offers a flexible approach to event scheduling and to-do-list management. This upgrade adds new features and fixes bugs that plagued the first version. Feb 93

★★★★ **DayMaker 2.0, Pastel Development Corp., 212/941-7500, \$129.95.** If you need to organize lots of disparate information, follow up on meetings with many people, keep track of your own calendar, create an archive of completed work, and print out lists of to-do items to take on the road, this free-form personal information manager is a great choice. May 93

★★★★ **Dynodex 3.0, Portfolio Software, 408/252-0420, \$89.95.** The speed and printing options of this field-based address-book manager are still its strengths, but this upgrade adds welcome improvements to the interface, including automatic formatting of phone numbers. Apr 93

★★★★ **EasyAlarms 2.0.3, Essential Software, 914/889-8365, \$99.** Complex, flexible calendar, reminder, and to-do list program includes scripting and sound recording among many other features. Nov 92

★★★★ **First Things First 2.0 (3.0), Visionary Software, 503/246-6200, \$69.95.** The nifty on-screen clock that floats serenely above your windows is the most appealing feature of this good but basic event-reminder utility. Apr 92

★★ **Hello, Atelier Systems, 619/453-4300, \$99.** Unusual combination of contact management and word processing in a compact package. This first release is hampered by several notable flaws, such as text documents that must be linked to a contact name. Jan 93

★★★★ **In Control 1.0 (2.0), Attain Corp., 617/776-1110, \$129.95.** Shrink an immense list down to a bare skeleton and expand it again using this to-do-list manager's clean interface and collapsible row-and-column format. May 92

★★★★ **Inspiration 4.0, Inspiration Software, 503/245-9011, \$295.** Watch your ideas evolve in a dynamic diagram mode and a text-based outline mode with this brainstorming tool. It works best as a vehicle for organizing and developing ideas. Feb 93

★★★★ **Intouch 2.0.4, Advanced Software, 408/733-0745, \$99.95.** Free-form database is a fast and

continues

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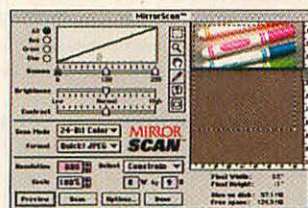
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Star Ratings

easy way to manage contact information. Program offers flexible data entry instead of automatic formatting. Although this version adds a handy reminder system, it falls short as a calendar planner. Feb 93

★★★★ **LapTrack for the Mac 1.0b, Timeslips Corp., 508/768-6100, \$79.95.** Time- and expense-tracking program offers the right features for the on-the-go professional, but the interface is overcomplicated and the documentation is sloppy. Still, in spite of its flaws, it does an excellent job. May 93

★★★★ **Nolo's Personal RecordKeeper 3.0, Nolo Press, 510/549-1976, \$34.96.** Hierarchically configured database organizes your personal affairs, including legal matters, financial records, insurance plans, family history, and more, but it is frustratingly inflexible. Jan 93

★★★★ **Now Up-to-Date 1.0.1, Now Software, 503/274-2800, \$99.** The swift performance and logical structure of this network calendar program make it easy to use, but deficiencies, such as the lack of a to-do-list function, are frustrating. Oct 92

★★★★ **Office Manager 2.1 (2.5), White Crow Software, 800/424-0310, \$99.** Simple contact- and project-management software is powerful for small databases, but reliance on HyperCard limits its usefulness for low-end Macs. Dec 92

★★★★ **Spiral 1.0, Technology Works, 512/794-8533, \$129.** Designed specifically for taking and organizing notes, this product provides an excellent feature set, including tabs, bookmarks, and an option for automatically expanding abbreviations, but it's marred by some annoying errors in the editing and import/export processes. Mar 93

★★ **TimeVision 1.0, Powercore, 815/468-3737, \$99.** New scheduler with notepad and card-file functions tacked on has some worthwhile features, but in general doesn't match up to the competition. May 93

★★★★ **TouchBase 2.0 (2.0.1), After Hours Software, 818/780-2220, \$125.** Entering data is quick and easy, and there are lots of useful printing options, but this personal information manager displays a few rough edges, such as not allowing you to copy the information in the Record Summary field. Aug 92

PRESENTATION TOOLS

★★★★ **Action 1.0, Macromedia, 415/252-2000, \$495.** Entry-level multimedia integration program offers, for its price, a rich selection of features, including an excellent variety of transitions as well as gradient and patterned backgrounds. It makes producing presentations with sound and motion surprisingly easy. Feb 93

★★★★ **Adobe Premiere 2.0 (2.0.1), Adobe Systems, 415/961-4400, \$495.** A dream command post for video professionals, this QuickTime movie-editing software produces stunning special effects with little effort. Only the program's appetite for memory, disk space, and computer horsepower prevent it from being the nonprofessional's dream as well. Jan 93

✓ **Aldus Persuasion 2.1 (2.12), Aldus Corp., 206/628-2320, \$495.** For slide presentations, this product provides an all-in-one studio where each element—outline entries, slides, notes, handouts, and charts—is dynamically linked to the others. It offers layered builds and automated templates, and has a proven track record.

★★★★ **Animation Clips 1.0, Media In Mo-**

tion, 415/621-0707, \$99. Spice up a presentation with an animated stapler, a jukebox that's a work of art, or any of 58 other customizable animations from these business-oriented packages. Marred only by some choppiness and a few lesser-quality animations. Jun 92

★★★★ **CameraMan 1.0 (1.1), Vision Software International, 408/748-8411, \$149.** If you need to record continuous screen operations, this screen recorder is the best deal around. It handles 32-bit QuickDraw, takes advantage of QuickTime's long list of compression and playback capabilities, and even uses custom frame sizes. Sep 92

★★★★ **Cinematic 1.0, Vividus Corp., 415/494-2111, \$495.** Easy-to-use program merges animation, interactivity, and presentation features, but the image- and text-handling capabilities are less than stellar. Jul 92

★★ **Comet CG 1.0.3, AT&T Graphics Software Labs, 317/844-4364, \$995.** Program for generating antialiased test over live video is reasonably priced compared with dedicated graphics systems, but you're likely to be as astonished by its limitations as you are impressed by its capabilities. It offers too few formatting options, a cumbersome interface, and an insubstantial manual. May 93

★★★★ **DiVA VideoShop 1.0, DiVA Corp., 617/491-4147, \$599.** Instantaneous playback sets this graceful QuickTime editing software apart. Its simple beauty is slightly offset by a few rough edges, a lousy manual, and an occasionally clumsy interface. Jul 92

✓ **HyperCard 2.1, Apple Computer, 408/996-1010, \$199.** Ease of use has made this multimedia-authoring software a tool for the masses. Although color is awkwardly implemented, more add-on products have been developed for this than for any other multimedia program.

★★★★ **MacroMind Director 3.1, Macromedia, 415/252-2000, \$1195.** This minor update to a powerful and versatile multimedia authoring tool adds 23 scripting commands, QuickTime importing and editing, and a utility that compiles movies into a faster playback format—but the whopping \$149 addition to the price makes it an upgrade most users can afford to miss. Feb 93

★★★★ **Magic 1.0 (1.1), Macromedia, 415/252-2000, \$395.** Outstanding editing features make this multimedia-presentation software easy to master. Many of the features of more-complex programs are missing, but what it does, it does well. Aug 92

★★★★ **Media-Pedia Video Clips, Media-Pedia, 617/235-5617, VHS \$195; S-VHS, Hi8, and 3/4SP \$295; BetaCamSP \$495.** Fifty-seven minutes of stock footage for use in QuickTime movies includes over 150 different segments, ranging from unremarkable to dramatic to genuinely funny. Apr 93

★★★★ **Microsoft PowerPoint 3.0, Microsoft, 206/882-8080, \$495.** This remarkable upgrade puts this presentation program ahead of the pack in terms of convenience and ease of use. Although the ready-made template collection is pretty paltry, the extensive system of master layers, reliable cross-platform compatibility, and strong on-screen presentation capabilities more than compensate. Feb 93

★★★★ **Morph 1.0, Gryphon Software Corp., 619/454-6836, \$149.** With patience and practice, you can become a high-tech special-effects wizard using this image-melding movie utility that "melts" one image into another. While using it is simplicity itself, you can only morph

still images, and the program suffers from some first-release glitches. Nov 92

★★ **Motion Works ProMotion 1.0 (1.02), Motion Works, 604/685-9975, \$395.** Inexpensive animation program consolidates a slew of tempting features, including flexible path tools and ambitious support for Apple events, but the capabilities are strung together with a weak and problem-ridden interface. Nov 92

★★★★ **Passport Producer 1.0, Passport Designs, 415/726-0280, \$495.** Strong timing controls and good sound capabilities mix with middling text- and image-handling and a lack of even basic animation options in this partially successful entry-level multimedia program. Apr 93

★★★★ **Special Delivery 1.0, Interactive Media Corp., 415/948-0745, \$399.** While this entry-level multimedia package has all the tools you need to assemble interactive screen presentations that burst with motion and sound, it has a disorienting interface and lacks the polish and power of other similarly priced programs. Mar 93

PROGRAMMING

★★★★ **EdScheme 3.4, Schemers, 305/776-7376, \$49.95.** This clear, elegant programming language is an excellent tool for learning good programming techniques, although it can't be used to create stand-alone applications. Nov 92

★★★★ **EISToolKit 2.0, MicroStrategy, 302/427-8800, \$1995.** Reliable, field-tested developer's environment for creating executive information systems provides automatic access to information in spreadsheets and databases across a distributed system, and serves up the information on screens that provide automatic graphing, analysis, and report generation. May 93

★★★★ **MetaDesign for the Macintosh 3.0, Meta Software Corp., 617/576-6920, \$250.** This diagramming tool for structured systems analysis offers easy ways to group and ungroup symbols in diagrams and to show relationships between symbols. It excels at austere, classic flowcharts but could use some flashier features, such as shaded backgrounds, for presentations. Mar 93

★★★★ **Object Master 1.0.2, ACI US, 408/252-4444, \$395.** Successful combination of the superior object-management facilities typically found in Smalltalk as well as a first-rate programmer's editor. Plus it works with the most popular languages: C, C++, and Pascal. Jan 93

★★★★ **Prograph 2.5, TGS Systems, 902/455-4446, \$495.** Elegantly designed, object-oriented development environment simplifies Macintosh programming. The graphics-based program is conceptually more advanced than traditional object-oriented programming. Jun 92

★★★★ **Serius Programmer 3.0, Serius Corp., 801/261-7900, \$395.** The graphical interface of this application-design environment provides nonprogrammers with tools for creating custom software, but the documentation lacks critical explanations. Jan 93

★★★★ **Think C 5.0, Symantec Corp., 408/253-9600, \$299.** Although not a radical improvement, this is a significant upgrade to an outstanding development tool. Beginners won't find the documentation helpful. Jul 92

continues

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Star Ratings

★★★★★ **Think Pascal 4.0, Symantec Corp., 408/252-3570, \$249.** A remarkable achievement—a programming language and environment full-bodied enough for professional programmers while still inviting for neophytes. No weak points and dozens of strengths. Aug 92

★★★★★ **UserLand Frontier 1.0 (2.0), UserLand Software, 415/369-6600, \$249.** A robust scripting language distinguishes this ground-breaking desktop programming tool that can automate desktop functions, repetitive data-managements tasks, and more. Scripts can only be used on computers with copies of the program. Jul 92

UTILITIES

❑ **After Dark 2.0, Berkeley Systems, 510/540-5536, \$49.95.** Turn your screen into an aquarium or a view of a night skyline with this whimsical screen saver that includes more than 30 different modules.

★★★★ **ALSoft Power Utilities 1.0.1 (1.0.2), ALSoft, 713/353-4090, \$129.95.** Buying this set of seven utilities is more economical than purchasing the included disk optimizer and resource manager (DiskExpress II and MasterJuggler) separately, but the other five utilities are unimpressive. Aug 92

★★★★★ **At Ease, Apple Computer, 408/996-1010, \$59.** Sweet, simple, secure substitute for the Finder displays a clean, attractive page full of oversize icons where a single click launches a program or document. To delete, rename, or move files, you have to return to the Finder. Mar 93

★★★★ **AutoDoubler 1.0.7 (2.0), Salient Software, 415/321-5375, \$79.95.** Designed to operate transparently, this automatic file-compression utility is a practical solution for users short on disk space, but it's missing many of the features of dedicated file-compression utilities, and it provides only limited control over the process. Sep 92

★★★★ **BetterWriters 1.0.1 (1.0.3), GDT Software, 604/291-9121, \$69.** Smart drivers teach your ImageWriter, StyleWriter, or DeskWriter laser printer tricks, letting it perform printing gymnastics such as inverting images and adding a variety of options for improving output. Minor incompatibilities with some common applications are inconvenient. Jul 92

★★★★★ **Citadel with Shredder 1.0 (1.1), Microcom, 919/490-1277, \$149.95.** Simple, convenient set of system-security tools covers all the bases, including password protection, encryption, permanent erasure, and more. Jun 92

★★★★★ **Conflict Catcher and Other Innovative Utilities 1.0, Casady & Greene, 408/484-9228, \$79.95.** Enable or disable your INITs and start-up items when you boot-up, with this INIT manager that comes with four other system-related utilities. Its ability to track down INIT-related problems makes it a worthwhile investment even if you already own another INIT manager. Mar 93

★★★★ **Copyright, CSG Technologies, 412/471-7170, \$49.** If you can justify spending \$49 purely for the sake of efficiency, this straightforward utility replaces the Finder's copy function, unobtrusively copying files to or from your Mac, in the background, while you move on to more interesting things. Apr 93

★★★★ **CPU 1.0j (2.0), Connectix Corp., 415/571-5100, \$99.** Indispensable items mix with trivial ones

in this collection of utilities for the PowerBook. It's a relatively inexpensive way to turn any PowerBook owner into a full-fledged power user. Apr 93

★★ **Crash Barrier 1.0.1 (1.1), Casady & Greene, 408/484-9228, \$79.95.** Control panel device is supposed to intervene during system crashes. It's a great idea but only works for certain types of crashes. Apr 92

❑ **DiskDoubler 3.7 (3.7.7), Salient Software, 415/321-5375, \$79.95.** With its impressive safety features, extremely tight compression, and respectable speed, this file-compression utility is a must-have for anyone who could use more hard drive space.

★★★★ **DiskFit Direct 1.0, Dantz Development Corp., 510/849-0293, \$49.95.** Basic but efficient backup system is simple and painless enough to foster better backup habits in anyone who uses it. It doesn't back up to hard drives or tape drives. May 93

★★★★ **DiskFit Pro 1.0 (1.1), Dantz Development Corp., 510/849-0293, \$125.** Effective backup utility requires a time- and disk-consuming initial full backup, but subsequent incremental backups are simple and speedy. It does not support tape drives. Apr 92

★★★★ **Drive 7 2.3, Casa Blanca Works, 415/461-2227, \$79.95.** Universal hard drive updater and formatter has an attractive, uncluttered interface that's so easy to use it makes hard drive maintenance almost relaxing. Jan 93

★★★★ **easyPrint 1.0, SF/O, 402/291-0113, \$29.95.** Nifty utility lets you switch printers without using the Chooser. It's a bargain for network users and those who frequently change output devices. Oct 92

★★★★ **Fastback Plus 2.6 (3.0), Fifth Generation Systems, 504/291-7221, \$189.** Even the most hardened shirker should be inspired to back up by the marvelously simple interface of this software. One warning—memory shortages can cause it to quit unexpectedly when running in the background. Apr 92

★★★★ **FolderBolt 1.02 (1.02c), Kent Marsh, 713/522-5625, \$129.95.** Three designated levels of folder protection, plus flexible options for password-handling, among other actions, are the assets of this utility. File encryption, however, is not included. Jun 92

★★ **Gofer 2.0, Microlytics, 716/248-9150, \$79.95.** Poky processing time is the trade-off for flexible text-search options without indexing by this file-finding utility. Our reviewer vetoed the trade. Jun 92

★★★★ **HAM 1.0, Microseeds Publishing, 203/435-4995, \$79.95.** Apple-menu enhancer adds submenus, allows reordering, and includes a folder of recently opened items in your Apple menu. Apr 92

★★★★ **Hard Disk Toolkit Personal Edition 1.1.2, FWB Software, 415/474-8055, \$79.** The more arcane features of the heavy-duty Hard Disk Toolkit have been stripped out of this entry-level, non-power-user version, but everything you really need to format, update, partition, and manage your hard drive is still included. Jan 93

★★★★ **INITPicker 3.0, Inline Design, 203/435-4995, \$79.95.** This INIT manager's ability to load aliased INITs over a network will interest network managers. While it disables problem INITs at start-up, it doesn't help you identify the cause of INIT conflicts that don't cause the Mac to crash at start-up. Mar 93

★★★★ **Inline Sync 1.0, Inline Design, 203/**

435-4995, \$129.95. Keep the latest version of your work on both your portable machine and your desktop Mac with this file-synchronization software. It's easy to install, easy to use, easy on the wallet, and does the job well. Mar 93

★★★★ **Kiwi Power Menus 1.0, Kiwi Software, 805/685-4031, \$39.95.** Simple little utility adds flexibility to the Apple menu by adding an unlimited number of submenus and enabling you to change the font and size in the menus. Dec 92

★★★★ **Kiwi Power Windows 1.5 (1.5.2), Kiwi Software, 805/685-4031, \$79.95.** Our skeptical reviewer found this system extension surprisingly handy. Its hierarchical menu lists all the open windows in the Finder and any applications. Jul 92

★★★★ **MacPalette II 2.2, Microspot USA, 408/253-2000, \$69.** You can print images from 8-bit and 24-bit color programs when you use an ImageWriter II with a four-color ribbon and this new driver that approximates halftones by dithering. While the results are less than state-of-the-art, so is the cost. Sep 92

★★★★ **MacTools 2.0, Central Point Software, 503/690-8090, \$149.** The consistent, 3-D-style interface makes it easy for the inexperienced user to navigate this utility package; the automated hard drive and floppy-disk repair capabilities and antivirus capabilities make it an asset for anyone. Oct 92

★★★★ **Magnet 1.0, No Hands Software, 415/321-7340, \$129.95.** Automation aids the laborious task of file management with this software. It creates "agents" or "magnets" that trigger in response to user-specified events and automatically look for files and folders to copy, move, or alias. Feb 93

★★★★ **MasterFinder 1.2.1, Olduvai Corp., 305/670-1112, \$149.** Ingenious finder utility provides rapid access to frequently used files and folders, permits operations on several files at once, and saves catalogs of offline volumes, but the many features require some effort to learn. Nov 92

★★★★ **More Disk Space 1.1 (1.2), Alys Software Corp., 415/566-2263, \$39.95.** Automatically compress and expand files with this utility. Although it doesn't identify compressed files, and must run as a start-up application to work automatically, it does offer a measure of control that similar utilities lack. Sep 92

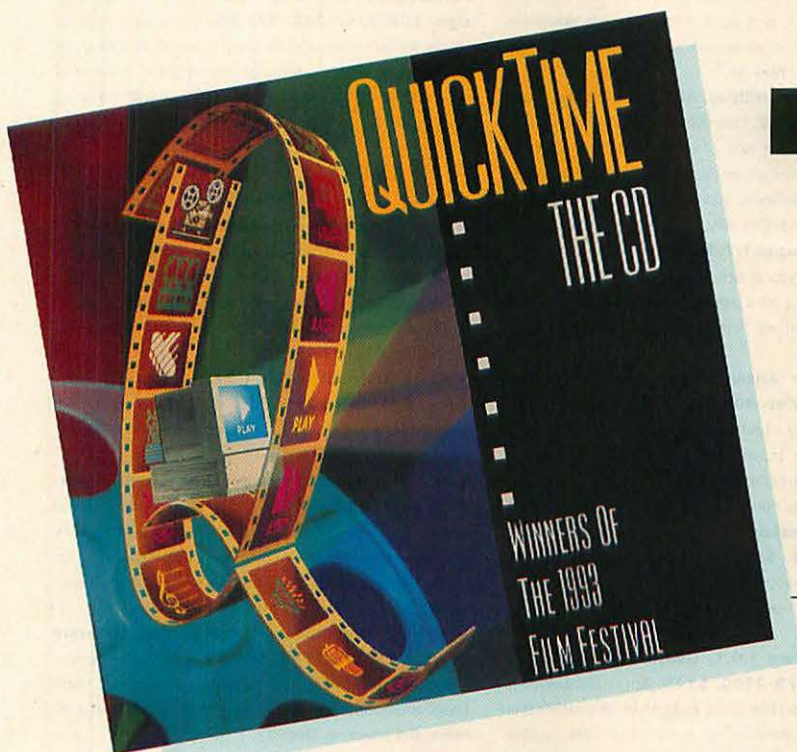
★★★★ **NightWatch II 2.0.1b, Kent Marsh, 713/522-5625, \$159.95.** Although skillful snoops can override the screen-locker feature of this hard drive security utility, the password protection provides a flexible and safe method of restricting access to anyone turning on your hard drive. Nov 92

★★★★ **Nok Nok 1.0 (1.0.3), Trik, 617/933-8810, \$49.95.** Plug the security holes that System 7 file sharing created, with this effective file-share monitoring utility that logs people's attempts to connect to your Mac, alerts you when someone does connect, and sets time limits for file share users. Oct 92

★★★★ **Norton Essentials for PowerBook 1.0, Symantec Corp., 310/453-4600, \$129.** Uneven collection of a dozen PowerBook utilities ranges from the unique and useful Instant Access module, which automatically turns AppleTalk on and off, to the relatively inaccurate Battery Gauge feature, which purports to tell you the status of your battery. Apr 93

continues

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Star Ratings

★★★★ **Norton Utilities for Macintosh 2.0**, Symantec Corp., 310/453-4600, \$149. Everything—including the kitchen-sink utility package does an excellent job of diagnosing and repairing damaged hard drives and floppy disks, but the interfaces of the various components differ wildly. Oct 92

☑ **Now Utilities 3.0.2 (4.0.1)**, Now Software, 503/274-2800, \$149. Despite minor imperfections, this collection of utilities, including ten separate programs and a variety of sample and support files, provides lots of highly polished bang for your buck.

★★★★ **On Location 2.0.1**, On Technology, 617/876-0900, \$129.95. Fast file-finding utility with improved functionality shows formatted files, and updates index in background. Alas, the initial indexing is time-consuming, and the search functions are incomplete. Jun 92

★★★★ **PicturePress 2.5**, Storm Technology, 415/691-6600, \$199. This image-compression software supports every useful storage mode; has new calculation features for improved image fidelity; offers utilities with practical advantages for day-to-day graphics work; and is twice as fast as version 2.0. If you work with images professionally, it's the clear choice. Mar 93

★★★★ **PowerMerge 1.0.2**, Leader Technologies, 714/757-1787, \$129. File-synchronization utility has a potentially confusing interface, but is a handy means of updating selected files so that different Macs end up with identical versions of the selected documents. Apr 93

★★★★ **RapidTrak 1.0.1**, Insignia Solutions, 415/694-7600, \$99.95. If you've got RAM to spare, this hard drive formatter offers driver-level RAM caching to store frequently used data and improve performance, especially on slower-speed drives. May 93

★★★★ **Retrieve It 1.0**, MVP Software, 415/599-2704, \$129. It's great that this nonindexed file-finding utility allows you to search by file name as well as by text, but it is definitely slower than indexed searching. Nov 92

★★★★ **Shredder 1.0.1**, DLM Software, 619/453-4984, \$69. Permanently blitz your data with this quick and easy trash-management tool that writes over deleted data—in accordance with Department of Defense specifications—so that file-restoration programs can't bring it back. Jul 92

★★★★ **Silverlining 5.4**, La Cie, 800/999-3919, \$149. Extensive and detailed testing is only one of many advanced functions offered by this hard drive-management utility. The interface is lackluster and apt to confuse beginners. Jan 93

★★★★ **SnapBack 1.0**, Golden Triangle Computers, 619/279-2100, \$129. For regular day-to-day backups, this network backup software is a great choice. Its strength lies in its simplicity and its easy-to-use, one-window interface, but it requires a dedicated hard drive. Dec 92

★★★★ **SpeedyCD 1.2.2 (1.2.4)**, ShirtPocket Software, 602/966-7667, \$70. Get Info gets faster with this CD ROM-access accelerator that creates a database of files from a CD and puts it on your hard drive. If you regularly browse through the same CD ROM folders, this product might save you enough time for it to be worth the \$70. Nov 92

★★★★ **Star Trek: The Screen Saver**, Berkeley Systems, 510/540-5535, \$59.95. Go where no Mac has gone before with this screen saver based on the

original "Star Trek." Modules vary from simple messages in "Trek"-inspired fonts to an endless parade across the ship's main screen of aliens, spacecraft, and artifacts from different episodes. May 93

★★★★ **Super 7 Utilities**, Atticus Software, 203/324-1142, \$99.95. Collection of seven control panels/extensions adds some ease of use to System 7, although none of its functions are essential. Modules perform tricks such as turning any menu into a tear-off palette, and randomizing the sounds that play in response to errors. Apr 93

★★ **SuperDuper 1.7**, NeoConcepts, 408/899-4821, \$79. If you're sick of duplicating disks with the Finder, this utility is an acceptable alternative, but there are other utilities that are better, cheaper, and do the same thing. Nov 92

☑ **Symantec Antivirus for the Mac (SAM)** (3.0.9), Symantec, 408/253-9600, \$99. No-holds-barred virus fighter monitors your Mac and alerts you when it sees suspicious activity. Advanced users and network managers will appreciate its customization features and extensive scanning options.

★★★★ **TimeLog 1.01 (1.02)**, Coral Research, 702/831-9346, \$97. Even jaded computer users will approve of the reporting options offered by this utility for recording program-usage information. No network features included. Jul 92

★★ **TimesTwo 1.0.1**, Golden Triangle Computers, 619/279-2100, \$149. Automatic disk-compression utility operates at the disk-driver level rather than as an operating system add-on. A number of quirks, such as its ungraceful handling of full disks, are disadvantages. May 93

★★★★ **UpDiff 1.0**, KyZen Corp., 609/354-3863, \$169. Innovative program compares two versions of a file, extracts the differences, and creates a difference file that is typically smaller than the original and can be used to update the older file. Dec 92

★★★★ **Voice Navigator SW 2.3**, Articulate Systems, 617/935-5656, \$399. Talk back to your Mac (if it has built-in sound input) with this speech-recognition software. Defining macros that respond to voice commands can be frustrating, but the product is a real boon for disabled users. Jan 93

★★★★ **Wallpaper 1.0.1 (1.0.2)**, Thought I Could, 212/673-9724, \$59.99. Terrific control panel device lets you design, edit, import, and display repeating patterns on your Mac's desktop. Comes with fun, creative predesigned patterns. May 92

★★★★ **WindoWatch 1.52 (1.53)**, ASD Software, 714/624-2594, \$149. If your main concern is to track program and file use, this utility will handle the job nicely. Using it for time billing with numerous programs, however, may be a maintenance nightmare. Jul 92

★★★★ **WonderPrint 1.0**, Delta Tao Software, 408/730-9336, \$59. StyleWriters and DeskWriters produce halftones good enough for newsletters with this printing extension that improves the output of QuickDraw printers and accelerates printing of pictures on PostScript printers. Jan 93

★★ **Workspace 1.0**, Ark Interface, 206/654-4127, \$149. Although this novel desktop replacement is an intriguing first step toward improving the Finder, not enough functionality was added to satisfy our reviewer. Jul 92

★★★★ **Zephyr Palettes for PageMaker**, Zephyr

Palettes for FreeHand 1.0.2 (1.3), Zephyr Design, 206/324-0292, \$79.95. Exchange pull-down menus for palettes in PageMaker or FreeHand with these cleverly conceived, modestly priced utilities. A number of details could still be smoothed, but none are real stumbling blocks. Jul 92

VERTICAL MARKETS

★★★★ **Compare-A-Loan 4.0.2**, Softflair, 612/894-3357, \$79.95. Although geared to professionals, this product for home-loan evaluation provides thorough documentation and is structured so that anyone can use it. Its reports compare payback schedules of various home-loan options. Apr 93

★★ **ConstructionMac 1.2 (2.0)**, Revelar Software, 801/485-3291, \$99. With a lot of work from you, this software will organize your construction or remodeling project. Oct 92

★★ **The Desktop Lawyer, The Open University**, 407/649-8488, \$99.95. The manual included with this collection of more than 300 legal-document templates provides an excellent overview of legal concepts; too bad the directions for filling out the forms are so unclear. Apr 92

★★★★ **Diet Balancer 1.0**, Nutridata Software Corp., 914/298-1308, \$69.95. Easy-to-use personalized weight-planning tool includes a database of nutritional values and standard serving sizes, and is useful for home diet-planning. Dec 92

★★★★ **Expert Home Design**, Expert Software, 305/567-9990, \$49.95. Quickly and easily create home- or office-interior layouts that are precise, but not as detailed as blueprints, with this interior design software that includes a large furniture library. It doesn't do automatic side views, or offer ⌘-key access to library objects, but it's a good value nonetheless. May 93

★★ **Expert Landscape Design**, Expert Software, 305/567-9990, \$49.95. Bare-bones drawing environment for experimenting with landscape design is inexpensive, but its usefulness is severely limited because of awkward color and pattern tools and because it doesn't identify plant types. Feb 93

★★★★ **Grade Machine 5.0**, Misty City Software, 800/795-0049, \$79. Teachers' lives get easier with this software that quickly sets up a useful electronic grade book. Program includes networking capabilities plus dozens of options for printing reports. Dec 92

★★★★ **JobTracker 2.02**, InfoSolutions, 814/355-2983, \$395 to \$844. Designed specifically for publication management, this scheduling and project-management software isn't completely polished, but it manages the job competently. Dec 92

★★★★ **Legal LetterWorks 1.0**, Round Lake Publishing, 203/438-1048, \$79.95. Any word processor can open the 165 legal-document templates included in this collection, and the modular form design is relatively versatile. Apr 92

★★ **LoanLease Library 3.0.3**, Softflair, 612/894-3357, \$79.95. If you are generating a loan or a lease and need to keep track of payments, this well-documented program for loan evaluation is a worthwhile investment, despite its minor eccentricities. Apr 93

★★★★ **Making the Grade 2.0**, Jay Klein Pro-continues

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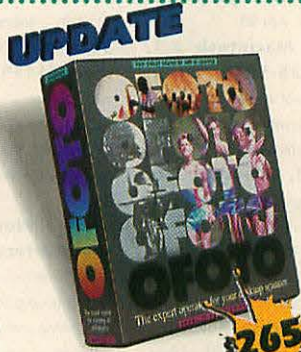
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★★★ MacWorld — April



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Star Ratings

ductions, 719/591-9815, \$99.95. The Macintosh version of the Apple II program Grade Busters 1/2/3, this grade-book software with dozens of reporting options is easy to learn; but if you're already spreadsheet-literate, the friendly dialog boxes and reminders may get in the way. Dec 92

★★★★ **Nolo's Living Trust 1.0, Nolo Press, 510/549-1976, \$79.95.** Gracefully guiding users through the process of drafting a living trust, this product is carefully thought out and a great value for simple trusts. Aug 92

★★★★ **Nutri-Calc Plus 1.2, Camde Corp., 602/926-2632, \$225.** Designed for knowledgeable and serious users, this powerful, flexible program manages nutrition information and analyzes diets. Dec 92

★★★★ **Stat-Ref 3.2a, Teton Data Systems, 307/733-9258, \$95.** Medical database on CD ROM lets you search by keyword. Because it provides access to limited sets of journal citations, it's not suitable for research, but it could effectively replace a small reference library in an office. Jan 93

WRITING TOOLS

★★ **Correct Grammar 3.0 (3.01), Wordstar International, 415/382-8000, \$99.** Illogical and inappropriate recommendations are a hallmark of all grammar checkers, but this one also violates Mac conventions in irritating ways. Aug 92

★★★★ **Correct Letters 1.1 (1.0), Wordstar International, 415/382-8000, \$49.** In addition to more than 250 ready-made business letters, this HyperCard-based product boasts an excellent online Guide to Letter Writing. The disabled Find command is mystifying and inconvenient. Jul 92

★★ **Correct Writing 2.0, Wordstar International, 415/382-8000, \$49.** For those who are unsure of the elements of style, this online reference is convenient and comparatively inexpensive, but it is far from complete. Sep 92

★★★★ **DocuComp II 1.0 (1.03), Advanced Software, 408/733-0745, \$179.95.** Document-management utility compares text in two versions of the same file and reports the differences in a comprehensive, easy-to-follow format. Nov 92

★★★★ **EndNote Plus 1.2 (1.2.1), Niles and Associates, 510/649-8176, \$249.** Reference database and tool for creating citations and bibliographies is now accessible from within Microsoft Word 5.0, representing a significant enhancement to this excellent product. Sep 92

★★★★ **Final Draft 2.0, MacToolkit, 310/395-4242, \$349.** Script-writing gets simpler with this well-conceived software that automates formatting of different elements in a script, including dialogue, action, and slug lines (scene headings). Customization is easy, and macros automate typing of common phrases such as "fade to black." Apr 93

★★★★ **IdeaFisher 2.0, Fisher Idea Systems, 714/474-8111, \$595.** Inspiration never comes easily, but this creativity tool with a question bank of 6000 questions and an idea bank of 61,000 words and 700,000 links might help get the juices flowing. Jan 93

★★★★ **Just Joking 1.0, WordStar International, 415/382-8000, \$49.** HyperCard stack of around 2800

humorous quotations offers a serviceable selection of sayings from a diverse group of humorists, comedians, philosophers, and writers, among others. Apr 93

★★★★ **LetterPerfect for Macintosh 2.1, WordPerfect Corp., 801/225-5000, \$149.** Stripped-down version of WordPerfect measures up as a serviceable low-end word processor, with clean, accurate documentation and an uncluttered interface. Jan 93

★★★★ **Microsoft Word 5.1, Microsoft, 206/882-8080, \$495.** Small, solid upgrade fine-tunes some plug-in modules and adds new modules including an icon tool bar, text annotation, and other features. The numerous minor enhancements make it worth the upgrade price, but it won't give Word 5.0 users goosebumps. Mar 93

★★ **Nisus Compact 3.3 (3.31), Nisus Software, 619/481-1477, \$150.** Inexpensive price and low disk-space requirements don't compensate for this word processor's many missing features, including mail merge, macros, and word count. Memory quirks are an additional problem. Aug 92

★★★★ **Plots Unlimited 1.04, Ashleywilde, 310/456-1277, \$399.** Peter loves Allison but she has a breakdown when he confesses to murder. Or maybe not. This writing tool's database contains 5600 plot twists, all linked. The interface is imperfect, leaving items in bold when they should be grayed out, and it requires too much mousing. Jul 92

★★★★ **Pro-Cite 2.0, Personal Bibliographic Software, 313/996-1580, \$395.** Valuable bibliographic database program generates large, complex bibliographies. Some features aren't easy to use, but it does have 20 predefined and 6 user-defined forms, plus flexible sorting options. Jun 92

★★★★ **RightWriter for the Mac 5.0, Que Software, 317/573-2500, \$99.95.** Grammar checker looks at writing style, word usage, punctuation, and capitalization, as well as grammar. Customizable writing-style filters and multiple approaches to analysis are nice, but—as with all grammar checkers—not all of the program's advice is great. May 93

★★★★ **ShowScape 4.1, Lake Compuframes, 914/941-1998, \$429, with WordPerfect 2.0 \$679.** This script-writing software formats scripts in either screenplay format or dual-column format (for audio and video) and allows you to choose the number of shots displayed per page, but it requires you to own and work in WordPerfect. Apr 93

★ **StoryLine 1.02 (1.4), Truby's Writers Studio, 310/575-3050, \$345.** Frustrating and sometimes haphazard HyperCard-based program attempts to offer expert training in the craft of plot development. Aug 92

★★ **Taste 1.02 (1.02c), DeltaPoint, 408/648-4000, \$149.** The page-view, WYSIWYG orientation of this word processor with page-layout features makes it considerably slower than text-oriented word processors. Redraw and translator bugs are other problems. May 92

★★★★ **Thunder 7 1.0.5 (1.5), Baseline Publishing, 901/682-9676, \$99.95.** The speed, customizing options, and overall feature-set of this stand-alone spelling checker and thesaurus are admirable, but before you can trust it implicitly, it needs a dictionary with greater integrity. Jul 92

★★★★ **TypeReader 1.0, ExperVision, 408/428-9988, \$695.** Speed and accuracy combine with a straightforward operating style in this high-end optical character-

recognition software that doesn't do everything its competition does, but is a major contender nonetheless. Feb 93

★★★★ **VersionMaster 1.5, AStar Technologies, 508/486-8532, \$199.95, five users \$799.95, ten users \$1199.95.** Document-management utility helps you archive and track versions of a file by maintaining a database of altered documents. It's recommended only for workgroups that routinely follow check-out procedures and that don't need detailed reports of the changes to a file. Apr 93

★★★★ **WordPerfect for Macintosh 2.1 (2.1.2), WordPerfect Corp., 801/225-5000, \$495.** Play QuickTime movies in your text files or publish and subscribe with this upgrade. It continues to provide the best desktop publishing and graphics capabilities of any word processor, but it lacks glossary- and table-creation features. Jun 92

★★★★ **WordScan, WordScan Plus 1.0 (1.01), Calera Recognition Systems, 408/720-8300, \$295, \$595.** The idiosyncratic interface of these two OCR programs is only a minor inconvenience considering their relative accuracy and speed. Jun 92

★★★★ **WriteNow 3.0, WordStar International, 415/382-8000, \$249.** The streamlined approach of this low-end word processor will appeal to many Macintosh users, especially the storage-conscious. A nice mix of features includes impressive implementation of style sheets. Sep 92

Hardware

INPUT DEVICES

★★★★ **A3 Mouse, Mouse Systems Corp., 510/656-1117, \$134.95.** A smooth ride and tight resolution characterize this optical device with three light-touch keys. Stronger software would have made it a more attractive package; the software's incompatibilities and limitations are a problem. Jun 92

★★★★ **Acecat for Macintosh, AceCAD, 408/655-1900, \$149.** It's the hands-down winner in the digitizing-tablet price competition, but although this product works well, it lacks some of the amenities of higher-end tablets. Aug 92

★★★★ **The Bat, Infogrip, 504/766-8082, \$495.** Right- and left-hand keypads slant the little fingers down and the thumbs up, with built-in wrist rests. Our reviewer considered it the best ergonomic device she'd seen; the downside is learning to type all over again. Oct 92

★★★★ **DrawingBoard II, Drawing Pad, CalComp, 800/932-1212, \$645, \$395.** Two likable features of these digitizing tablets are the transparent, hinged cover for securing artwork, and a menu strip with buttons for changing drawing modes and accessing macros. Stylus problems and CalComp's haphazard tech support are drawbacks. Jul 92

★★★★ **Mouse-Trak, Itac Systems, 214/494-3073, \$179.** Well-positioned, easy-to-rotate trackball with a soft wrist-pad is comfortable to use, but must be disassembled to reconfigure the buttons. Nov 92

★★★★ **MouseMan, Logitech, 510/795-8500, \$129.** Bear-paw-shape mouse with three programmable buttons is handsome and solidly made. It may be too big for some hands. Jun 92

continues

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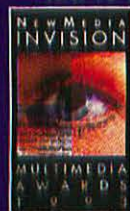
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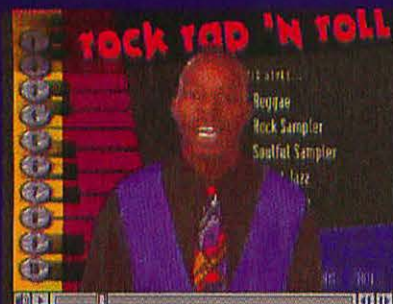
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Star Ratings

★★★ **TrackMan, Logitech, 510/795-8500, \$149.** There's a right-hand bias to this trackball with three programmable buttons and a handy click-lock feature. Jun 92

★★★★ **Turbo Mouse 4.0, Kensington Microware, 415/572-2700, \$169.95.** The large buttons on either side of this trackball provide just the right measure of tactile feedback while the removable ball glides freely. The breakthrough feature, though, is the software that lets you customize many of the trackball's functions. Nov 92

★★★ **The UnMouse, MicroTouch Systems, 508/694-9900, \$199.** Input device is a cursor-control device, programmable keypad, and small graphics tablet in one, and can be programmed with 60 macros (although only 16 can be selected by sight). It's ergonomically better than a mouse, but not as good as a trackball. May 93

★★★ **Voice Express, MacSema, 503/757-1520, \$399.** Voice-recognition board lets you record words or phrases that trigger simple key sequences, but commands are limited to those with keyboard equivalents, and the system is weighed down by several quirky features. Apr 92

★★★ **Voice Navigator II, Articulate Systems, 617/935-5656, \$699.** Stand-alone SCSI device offers an impressive, full-featured set of tools for voice control of your Mac, but mastering them takes time and effort. Apr 92

★★★ **Z-Nix Cordless SuperMouse, Z-Nix, 714/629-8050, \$99.** Sleek and attractive cordless mouse works reliably and is attractively priced, but suffers from the same line-of-sight limitations as other infrared devices (such as TV remote controls). Dec 92

MISCELLANEOUS HARDWARE

★★★ **ACS300 Computer Speaker System, Altec Lansing Consumer Products, 717/296-4434, \$400.** Clamshell-shape high/midrange speakers come with a freestanding subwoofer and power supply. The sound is rich and smooth, but the cabling is nonstandard, and there is no on/off switch. Nov 92

★★★ **Bose RoomMate speakers, Bose Corp., 508/879-7330, \$329.** Shielded stereo speakers with a rich, bassy sound can double as regular stereo speakers. Unfortunately, they're heavy, expensive, and the highs are muddy. Jun 92

★★★ **MacSpeaker MS-1, Monster Cable, 415/871-6000, \$229.95.** Crystal-clear highs and a meaty midrange are the best features of these shielded stereo speakers. They're beautifully designed for close-up listening, but the bass sounds wimpy. Jun 92

★★★★ **Media Control Station, JLCopier Electronics, 310/306-4131, \$269.95.** This versatile tool connects to the Mac through an ADB port and offers an easy and intuitive way to cue and edit QuickTime movies, MIDI files, multimedia playlists, and other dynamic data. Feb 93

★★★★ **The Miracle Piano Teaching System 1.0, Software Toolworks, 415/883-3000, \$499.95.** Painstakingly crafted music and piano instructor comes with keyboard, software, and 120 songs, including classical, movie-theme, and rock. The program offers encouragement and advice, and ends every lesson with a synthesized orchestra accompaniment. Oct 92

★★★★ **The Mouse Yoke, Colorado Spectrum, 303/225-6929, \$34.95.** Gadget turns an ordinary mechanical mouse into an aircraft-style steering wheel, or yoke, for use with flight simulators. Simple, elegantly executed concept uses quality materials; device is not appropriate for driving simulations or shooting games. Dec 92

★★★ **Organizer Link II (Model OZ-893), Sharp Corp., 800/321-8877, \$129.99.** If you own a 5000-, 7000-, or 8000-series Sharp Wizard, this program and cable allow you to connect it to a Mac serial port to exchange data. It's functional, but does have some minor weaknesses. Jan 93

★★★ **PhonePro 1.0.3 (1.1), Cypress Research Corp., 408/752-2700, \$950.** Application makes it relatively easy to develop a multiple-choice voice-mail system using your Mac, especially for those with programming backgrounds. The product includes a 9600-bps modem and a headset/microphone. Feb 93

★★★★ **PowerKey 2.0, Sophisticated Circuits, 206/485-7979, \$119.** Ingenious, well-designed automated power strip has four surge-protected outlets that are controlled by the keyboard's on/off switch. The equally clever software can turn on your Mac, unattended, run a QuickKeys macro (QuickKeys Lite included), and shut down again. Dec 92

★★★★ **Ringo LM, MacSema, 503/757-1520, \$189.95.** If your sole phone-line is doing double duty as a fax and voice line, this telephone-line manager is the answer to your prayers. May 92

★★★ **Yamaha TG100, Yamaha Corp. of America, 714/522-9011, \$449.** Compact, keyboard-less, multitimbral MIDI synthesizer with built-in MIDI interface adheres to the life-simplifying General MIDI standard patch arrangement. Although it won't convince you that you're hearing a live orchestra, the sound is about as realistic as low-cost MIDI gets. Apr 93

MODEMS/NETWORK HARDWARE

★★★★ **Comstation 2, PSI Integration, 408/559-8544, \$399.** Unusually well designed software accompanies this fax/data modem. The simple, straightforward interface and handy QuickFax DA are positives; uninformative error messages are minor negatives. Jun 92

★★★ **Comstation 4, PSI Integration, 408/559-8544, \$499.** An otherwise solid fax/data modem for network use is hurt by an awkward process for distributing faxes, plus the need for a separate file server and fax server. Jun 92

★★ **EtherPrint, Dayna Communications, 801/531-0600, \$499.** It's possible to connect a single LocalTalk printer to an Ethernet network using this device, but it's an expensive option. Dec 92

★★★ **EtherPrint Plus, Dayna Communications, 801/531-0600, \$649.** Support four LocalTalk products on an Ethernet network using this device that can also serve as an inexpensive AppleTalk router. Dec 92

★★★★ **EtherWrite, Compatible Systems Corp., 303/444-9532, \$695.** Elegant and cost-effective device with excellent network-management software allows up to six LocalTalk products to connect to an Ethernet network. Dec 92

★★★★ **PathFinder, Dayna Communications, 801/531-0600, \$899.** For simple networks, this LocalTalk-to-Ethernet router is a great value, as well as a

great time-saver for beginning network managers. It uses AppleTalk only. Jan 93

★★★ **PowerModem, PSI Integration, 408/559-8544, \$299.** Superior fax software distinguishes this fax/data modem for PowerBooks, but it's not the best choice for those who do a lot of online work that requires a high-speed data modem. Jul 92

★★★★ **PowerPort/Gold, Global Village Communications, 415/329-0700, \$499.** If you need 14,400-bps throughput, this data/fax modem is a champ. Its improved software and packaging raise the standards for PowerBook modems. Dec 92

★★★ **QBlazer, Telebit Corp., 408/734-4333, \$599.** If portability is an important issue, this 9600-bps modem's pint size and battery power make it an attractive choice; otherwise, its high price plus the lack of Mac software and send-fax features work against it. May 92

★★★ **QuickTel Xeba 9600, Logicode Technology, 805/499-4443, \$319.** Sleek, slanty, futuristic-looking fax modem offers all the features you'd expect, including acceptable fax software. Apr 92

★★★★ **Sportster 14,400 Fax/Data Modem, U.S. Robotics, 708/982-5001, \$599.** Several nice features, including an easily accessible power button and a front-mounted volume-control dial, make this 100 percent Mac-ready, 14,400-bps fax/data modem better than average. Feb 93

★★★★ **SupraFaxModem V.32bis, Supra Corp., 503/967-2400, \$399.95.** Send and receive faxes and data at speeds up to 14,400 bps with this attractively priced fax/data modem. The software works well; tech support is adequate. Aug 92

★★ **Ultima Home Office, Prometheus Products, 503/692-9600, \$649.** When it can reliably transmit data at high speeds and the voice bugs are fixed, this fax modem with voice mail will be worth a second look. Oct 92

★★ **Viva 14.4/Fax, Computer Peripherals, 805/499-5751, \$469.** In data mode, this 14,400-bps fax/data modem performed well, but the software bundled with it is barely adequate. Jan 93

★★ **WorldPort 9600 MNP5, U.S. Robotics, 708/982-5001, \$475.** Only slightly larger than a deck of cards, this 9600-bps modem is geared toward PC users, with a user guide that never mentions Macs and software that is only for PC compatibles. Jan 93

PRINTERS

★★ **C. Itoh ProWriter Printer, C-Tech Electronics, 714/833-1165, \$2395.** Not only is this laser printer more expensive than most personal page printers, it also offers less-impressive features and so-so output. Nov 92

★★★★ **DEClaser 1152, Digital Equipment Corp., 508/493-5111, \$1299.** Four-pages-per-minute, 300-dpi, PostScript Level 2 printer offers simultaneous support for Macs and PCs, plus excellent image quality, for a ground-breaking price. The internal font set is small, and the included 2MB of memory is not enough to print complex images. May 93

★★★★ **HP LaserJet 4M, Hewlett-Packard, 800/752-0900, \$2999.** An Intel i8960 RISC processor makes printing complex images faster than ever with this *continues*

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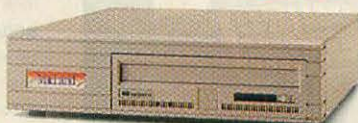
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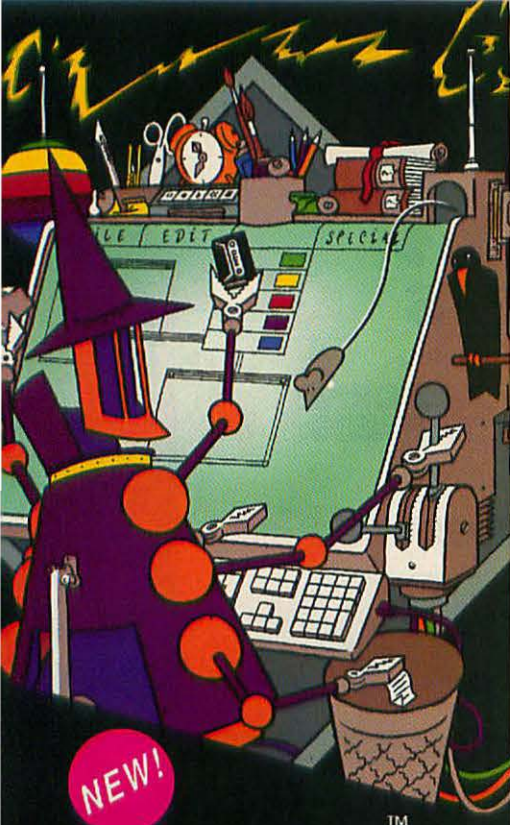
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MAC WORLD

Star Ratings

600-dpi printer, while the Canon LBP-EX print engine and microfine toner guarantee smooth curves and crisp characters. An autoswitch feature makes it a flexible option for mixed-platform offices. **Feb 93**

★★★★ **HP PaintJet XL300, Hewlett-Packard, 800/752-0900, \$3495.** The output of this color ink-jet printer won't satisfy demanding graphic arts professionals, but it's great for business users interested in punching up their presentations. **Oct 92**

★★★★ **IBM LaserPrinter 10A, IBM Corp., 800/358-5835, \$3995.** Beautifully defined text, razor-sharp line art, clear gray tones—the output from this large, awkwardly designed, 600-dpi PostScript printer is dazzling, and all for under \$4000. **Aug 92**

★★★★ **LZR 1560, Dataproducts Corp., 818/887-8000, \$3395.** Tabloid-size 400-dpi laser printer blazed through our standard printer speed tests and produced output noticeably better than that of 300-dpi printers. It's a good choice for a mixed network. **Sep 92**

★★★★ **LZR 960, Dataproducts Corp., 818/887-8000, \$2195.** This peach of a personal PostScript printer is compact, fast, and produces excellent output. Our reviewer experienced low-memory error messages, but most memory problems should be solved with the current shipping configuration of 3MB of RAM. **Jul 92**

★★★★ **RasterOps CorrectPrint 300, RasterOps Corp., 408/562-4200, \$8999.** The cost of high-quality, photo-realistic color printing takes a nosedive with this 300-dpi, dye-sublimation printer. The relatively small (8.1 by 8.6 inches on letter-size media) print area is the only significant flaw. **Oct 92**

★★★★ **RealTech Laser 400, Hardware That Fits, 409/760-2400, \$3195.** Exactly the same tabloid-size, 400-dpi printer as the Dataproducts LZR 1560, but for slightly less money. And it produces output that is perceptibly better than that of 300-dpi printers. **Sep 92**

★★★★ **StyleWriter, Apple Computer, 408/996-1010, \$399.** If money is tight, if you want nice-looking output, and if you have a little extra time to spare, this is a good personal printer with a new driver that makes it even better. **Sep 92**

★★★★ **TI microLaser Turbo, Texas Instruments, 800/527-3500, \$2349.** An enhanced version of TI's microLaser Plus, this PostScript Level 2 printer is an admirable performer and a dependable machine, but it leaves you wondering whether the extra \$500 is worth it. **Jul 92**

★★★★ **WideWriter, GCC Technologies, 617/890-0880, \$1699.** Large-format output comes in a reasonably priced package with this ink-jet printer that can automatically feed sheets as large as 14 by 91 inches or manually feed sheets 17 inches wide with an unlimited length. **Feb 93**

★★★★ **WriteMove II, GCC Technologies, 617/275-5800, \$599.** Portable printer for the PowerBook measures 11½ by 2 by 3½ inches and weighs 2½ pounds. Although it's no speed demon, it's fine for short jobs. **May 93**

SCANNERS

★★★★ **HP ScanJet IIP, Hewlett-Packard, 800/752-0900, \$1095.** An elegant piece of technology, this desktop gray-scale scanner produces excellent results for a street price of around \$750. Muddled online help and a flimsy hinge are minor problems. **Aug 92**

★★★★ **LightningScan Pro 256, Thunderware, 510/254-6581, \$649.** A well-executed hand-held gray-scale scanner worth the cost. It creates 8-bit scans at up to 400 dpi; images scanned in two passes can be joined flawlessly. The only drawback is slow scrolling in software. **Jun 92**

★★★★ **Mirror 600 Color Scanner, Mirror Technologies, 612/633-4450, \$1199.** Three-pass scanner with 600-dpi vertical and 300-dpi horizontal resolution is fast, precise, and an excellent value. The only liability is its somewhat quirky software. **Apr 92**

★★★★ **Nikon LS-3510AF Film Scanner, Nikon, 516/547-4355, 8-bit \$9535, 24-bit \$11,316.** The bread-box-style design of this 35mm film scanner may be reminiscent of past models, but many changes make it faster and more convenient. Still, advanced users won't be satisfied with the tools for overriding automatic exposure and tone adjustments. **Sep 92**

★★ **PageBrush Professional, Mitsubishi International, 415/544-2781, \$795.** A brilliant idea with unfortunate rough spots. Gray-scale, hand-held scanner/mouse scans full-page or larger images and produces 300-dpi gray-scale files, but the process and software are agonizingly slow; the buttons are hypersensitive; and the product is expensive. **Jun 92**

★★ **RasterOps Expresso Personal Slide Scanner, RasterOps Corp., 408/562-4200, \$849.** Essentially a video camera mounted above an illuminated stage, this slide scanner outputs NTSC video. It's fast, convenient, and economical, but falls short for digital images; its best file looks worse than output from a 24-bit flatbed or slide scanner. **Apr 92**

SYSTEMS/STORAGE

★★★★ **Duo Dock, Apple Computer, 408/996-1010, \$1079.** Immensely clever desktop-Mac-size housing for the Duo laptops provides back-panel connectors, a SuperDrive, electrical and physical support for external monitors, and two expansion slots. Although the Duo Dock is easy to like, some details, such as the difficulty of installing NuBus boards, belie Apple's usual attention to detail. **Mar 93**

★★★★ **FastCache Quadra, Daystar Digital, 404/967-2077, Quadra 950/900/700 version \$449, Quadra 900/700 version \$299.** PDS board provides 128K of secondary cache for a Quadra with 15ns static RAM (25ns on the 900/700 version). The average real-world speed improvement is 15 percent, although some operations benefit more from the cache card than others. **May 93**

★★★★ **Floptika 20/M, Procom Technology, 714/852-1000, \$585.** It is easy to recommend this floptical drive due to its speed, relatively low cost, bundled software, and lack of problems. Although it allows invalid SCSI ID addresses, it's a fine product. **Sep 92**

★★★★ **Freedom 120, Maxen, 619/944-0818, \$699.** Battery-powered hard drive provides three to four hours of hard drive storage without a power cable; it performs at a respectable speed, but lacks a battery-power gauge and automatic sleep mode. The skimpy manual is the most serious problem. **Sep 92**

★★★★ **Infinity Floptical 21MB, Peripheral Land, 510/657-2211, \$599.** The good points of this floptical drive include extensive documentation, switchable

termination, and an autoeject function, but the bad points are the odd size, the incompatibility of the bundled software with System 7, and inappropriate formatting of 800K disks. Sep 92

★★ **Performance/040 (33MHz), Impulse Technology, 404/889-8294, \$2399.** For disk-intensive tasks, this 68040 33MHz accelerator board tested slower than the native CPU and, in general, was slower than comparable accelerator boards. It is compatible with all Mac II's. Oct 92

★★★ **PLI MiniArray 850MB, PLI MiniArray 2GB, Peripheral Land, 510/657-2211, \$6999.** These RAID storage systems contain multiple drives that work as a single unit; they're an excellent option for image processing or tasks that involve importing and exporting large files, but the price per megabyte is high. Jan 93

★★★ **PowerBook 145, Apple Computer, 408/996-1010, \$2149 to \$2499.** Adequate but essentially outdated notebook computer is an upgraded version of the discontinued PowerBook 140 with a faster 25MHz 68030 CPU, but RAM expansion is limited, and it doesn't have a built-in video port. Feb 93

★★★★ **PowerBook 160, Apple Computer, 408/996-1010, \$2429 to \$3149.** A built-in video port and gray-scale capability are the new features Apple offers with this notebook computer. While it offers good processing speed and power, the passive matrix display doesn't cut it for all-day use as a primary screen. Feb 93

★★★★ **PowerBook 180, Apple Computer, 408/996-1010, \$4109 to \$4469.** An active matrix screen and a math coprocessor are the only differences between this notebook computer and the PowerBook 160, but the beautiful display is worth the extra \$1000. Feb 93

★★★★ **PowerBook Duo 210 and 230, Apple Computer, 408/996-1010, 210 (4/80) \$2249, 230 (4/80) \$2609.** Apple's smallest computers have the pleasing heft, size, and shape of hardbound books but pack the horsepower of 030 chips. Although the screen, keyboard, and trackball (more of a "trackmarble") feel small, these computers virtually cry out to be picked up, handled, and used. Mar 93

★★★ **QuadFlextra, Quadram, 404/923-6666, \$495.** Remarkable super-high-density floppy drive uses an ingenious disk-formatting method to put just over 20MB on a single 3½-inch floppy disk, but it may not be as cost-efficient as other options. Apr 92

★★★★ **Quantum Passport XL 240, Quantum Corp., 800/624-5545, external chassis \$469, 240MB drive \$979.** An excellent piece of engineering, this fast, trouble-free, removable hard drive is designed to solve the problem of how to transport data from one computer to another. The price is only somewhat discouraging. Oct 92

★★★★ **Radius Rocket 33, Radius, 408/434-1010, \$2499.** The accelerator board of choice for our reviewer, this 68040, 33MHz board is fast, reasonably priced, and compatible with a Mac II (with Rev. B ROM), IIx, IIcx, or IIfx. Oct 92

★★★ **TokaMac II FX 33, Fusion Data Systems, 512/338-5326, \$2995.** CPU and FPU tasks on a Mac IIfx are faster than on a Quadra 950 with this 68040 33MHz accelerator board, but video- and disk-intensive tasks are still slower. It may be worth the cost if your IIfx already has a fast video board and more than enough memory. Oct 92

VIDEO/DISPLAY

★★★ **BookView Imperial, Computer Care, 612/371-0061, \$1399 (includes 6MB of RAM).**

This notebook-display adapter supports all common sizes of monitors, including 16-inch and 19-inch, plus both Mac and VGA. It is expensive, however, and uses 2MB of system memory for video processing. Feb 93

★★★ **Canon ESP, Canon USA, 516/328-5970, \$4500.** No-nonsense package enables you to shoot still-video pictures, digitize the video into a Mac for touch-up, and record the modified shots back to the camera for playback through any television set. It's good for presenters who need to incorporate photographs, but it is quite expensive. Apr 93

★★★ **Canon RC250, Canon USA, 714/753-4320, \$799.** An adequate choice for users looking for an inexpensive still-video system. Camera captures up to 50 color images per video floppy disk and hooks up to any television. Jun 92

★★ **Dycam Model 1, Dycam, 818/998-8008, \$895.** Compact, point-and-shoot, still-video camera records and downloads images in 8-bit gray-scale—as long as the battery doesn't die first. Jun 92

★★★ **L-TV, Lapis Technologies, 510/748-1600, \$349.** Interface board allows a Mac LC, LC II, or Performa to use a standard television monitor as a display device. Unfortunately, a standard television is a poor substitute for a color monitor, so while the L-TV does its job adequately, the setup is unsuitable for many applications. May 93

★★★ **Lighting Effects II, Spectral Innovations, 408/955-0366, \$1295.** Digital-signal-processor chips dramatically speed up some Photoshop operations with this expensive Photoshop-acceleration board. It had problems acquiring some JPEG files. May 93

★★★★ **Macintosh 16" Color Display, Apple Computer, 408/996-1010, \$1599.** The display quality of Apple's 16-inch monitor is tough to beat. It has realistic color, minimal curvature, and a uniform display. Jun 92

★★★ **Power Portrait, Sigma Designs, 510/770-0100, \$899 or \$949.** Hook your Classic or PowerBook to this 15-inch portrait-style monochrome display. Built-in QuickDraw acceleration speeds up the slow SCSI connection on the one hand and results in a few software incompatibilities on the other. Feb 93

★★★★ **PowerVision, Mirror Technologies, 612/633-4450, with no RAM \$499, with 2MB of RAM \$699, with 4MB of RAM \$999.** Separate VRAM means you don't lose system memory with this nicely priced notebook display adapter. It only supports 12-inch and 14-inch monitors, and 15-inch portrait gray-scale and black-and-white monitors. Feb 93

★★★★ **ThunderStorm, SuperMac Technology, 408/245-2202, \$999.** Photoshop-acceleration board uses digital-signal-processor chips to speed up some Photoshop operations. It's fast, with good JPEG compatibility and a great manual. May 93

★★★★ **VideoSpigot, SuperMac Technology, 408/245-2202, \$499 to \$1599.** Grab video from a camcorder, video deck, TV, or monitor with this easy-to-install board and save it as a 24-bit QuickTime movie. Comes with ScreenPlay, an application that lets you choose from among several compression options, frame rates, and window sizes. May 92 **m**

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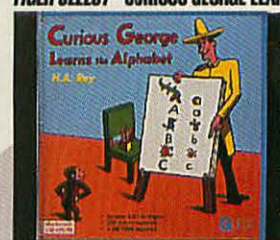
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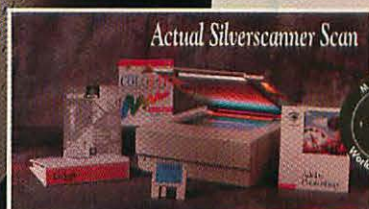
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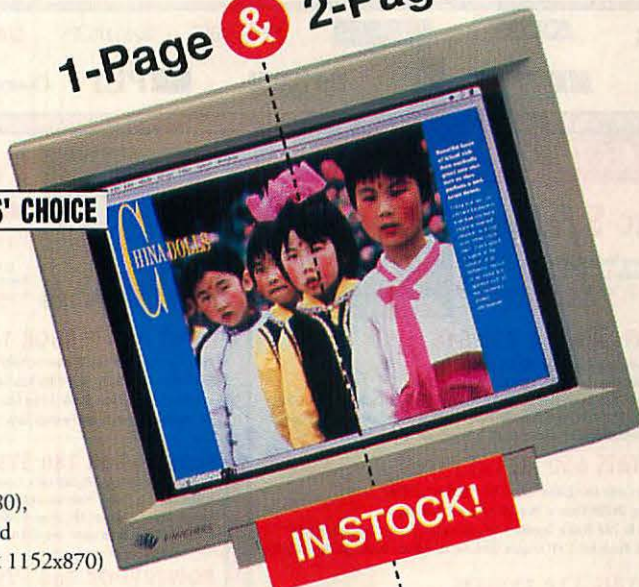
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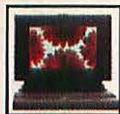
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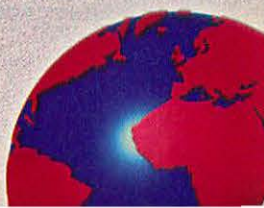
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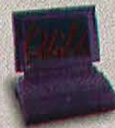
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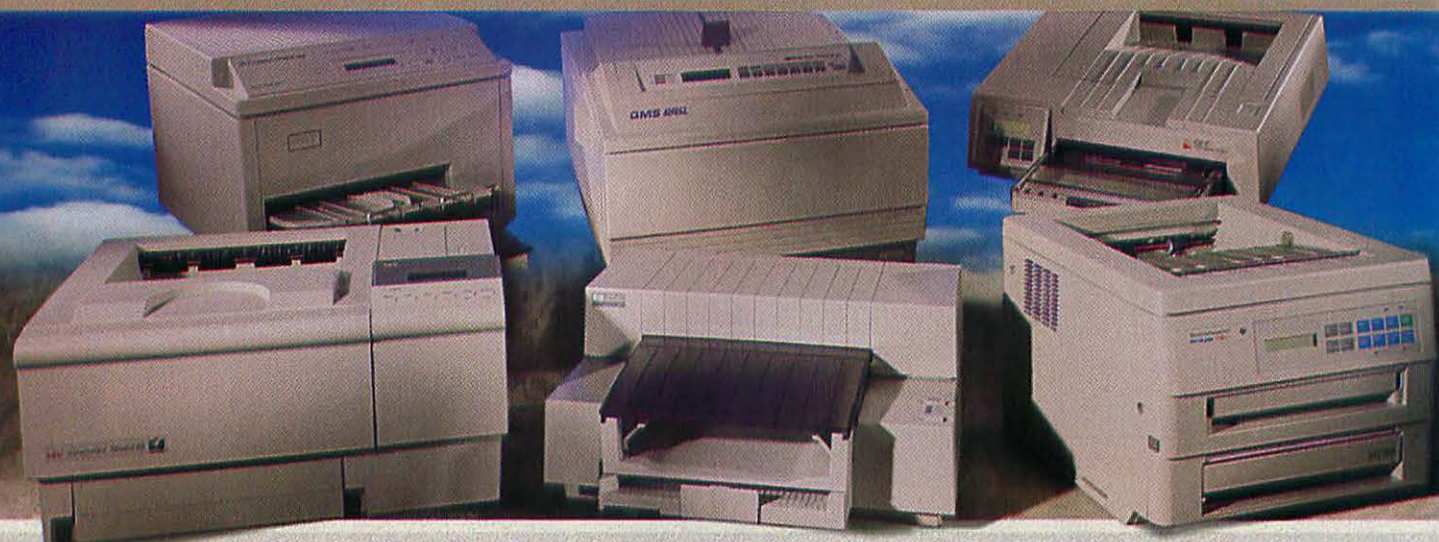
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August 1992



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September 1992

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Internal 44mb SyQuest (for Quadra 900/950)	\$345
Internal 88mb SyQuest (for Quadra 900/950)	\$465
Internal 88mb C SyQuest (for Quadra 900/950)	\$555
External SyQuest Dual 44mb (*One Cartridge Inc.)	\$725
External SyQuest Dual 88mb (*One Cartridge Inc.)	\$895
External SyQuest Dual 44/88mb (*One 44 & One 88 Cartridge)	\$895
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External SyQuest Dual 44/88C mb (*One 44 & One 88 Cartridge)	\$995
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ELS 85mb	17ms	3.5"TH	\$199	\$259
ELS 127mb	17ms	3.5"TH	\$259	\$319
ELS 170mb	17ms	3.5"TH	\$299	\$359
LPS 105mb	10ms	3.5"TH	\$239	\$299
LPS 120mb	10ms	3.5"TH	\$279	\$339
LPS 240mb	10ms	3.5"TH	\$369	\$429
LPS 525mb	10ms	3.5"TH	\$899	\$959
Pro 700mb	10ms	3.5"HH	\$1179	\$1239
Pro 1.05gb	10ms	3.5"HH	\$1339	\$1399
Pro 1.22gb	10ms	3.5"HH	\$1499	\$1559
*60*80mb	16ms	2.5"PB	\$299	\$399
*60*120mb	16ms	2.5"PB	\$379	\$479

TWO YEAR WARRANTY. *ONE YEAR WARRANTY ON GO DRIVES.
FWTB™ HDT FORMATTING SOFTWARE INCLUDED

MICROPOLIS

FORMATTED CAPACITY	SPEED	SIZE	INTERNAL	EXTERNAL
698mb	10ms	3.5"HH	\$1239	\$1299
1.05gb	10ms	3.5"HH	\$1339	\$1399
2.1gb	12ms	5.25"FH	\$2695	\$2795

FAST SCSI-2 DRIVES. FIVE YEAR WARRANTY.
FWTB™ HDT FORMATTING SOFTWARE INCLUDED.

CONNER

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FORMATTED CAPACITY	SPEED	SIZE	INTERNAL	EXTERNAL
82mb	17ms	3.5"TH	\$195	\$255
160mb	13ms	3.5"TH	\$269	\$329
206mb	12ms	3.5"TH	\$359	\$419
515mb NEW!	10ms	3.5"HH	\$899	\$959

TWO YEAR WARRANTY.
FWTB™ HDT FORMATTING SOFTWARE INCLUDED.

TOSHIBA

FORMATTED CAPACITY	SPEED	SIZE	INTERNAL	EXTERNAL
877mb	12.5ms	3.5"HH	\$1039	\$1099
1.23gb	12.5ms	3.5"HH	\$1339	\$1399
213mb NEW!	12ms	2.5"PB	\$639	\$699
600mb NEW!	200ms	3.5"HH	\$539	\$599

Kodak Photo-CD/Multisession compatible

TOSHIBA CARRIES A THREE YEAR WARRANTY ON
DRIVES. ONE YEAR WARRANTY ON CD ROM. FWTB HDT FORMATTING
SOFTWARE INCLUDED.

FUJITSU

FORMATTED CAPACITY	SPEED	SIZE	INTERNAL	EXTERNAL
513mb SPECIAL!	9ms	3.5"HH	\$899	\$959
672mb SPECIAL!	16ms	5.25"FH	\$999	\$1099
1.0gb NEW!	9ms	3.5"HH	\$1699	\$1759
1.03gb	15ms	5.25"FH	\$1299	\$1399
1.65gb	15ms	5.25"FH	\$2289	\$2389
2.05gb	12ms	5.25"FH	\$2449	\$2549

FIVE YEAR WARRANTY.
FWTB™ HDT FORMATTING SOFTWARE INCLUDED.

Maxtor®

FORMATTED CAPACITY	SPEED	SIZE	INTERNAL	EXTERNAL
120mb	15ms	3.5"TH	\$229	\$289
203mb	15ms	3.5"TH	\$339	\$399
325mb	15ms	3.5"HH	\$589	\$649
520mb NEW!	9ms	3.5"HH	\$975	\$1035
1.15gb NEW!	9ms	3.5"HH	\$1599	\$1659
1.0gb	13ms	5.25"FH	\$1295	\$1395
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4x8/16x8	\$125/\$525
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4mb/6mb/8mb/10mb	\$225/\$295/\$395/\$445
Duo 210/230	
4mb/8mb	\$299/\$499
PC 1x9/4x9	\$39/\$139
NEW 32-BIT SIMMS	\$CALL
4x8/8x8/16x8	\$134/\$269/\$599

MAGNETO OPTICAL DRIVES

TEAC

MODEL	SPEED	SIZE	EXTERNAL
128mb	45ms	3.5"HH	\$979
128mb cartridges (Tosoh)			\$39

IRIGOH

MODEL	SPEED	SIZE	EXTERNAL
128mb	45ms	3.5"HH	\$1075
650mb	28ms	5.25"FH	\$2345
128mb/650mb Cartridge			\$39/95

SHARP

MODEL	SPEED	SIZE	EXTERNAL
650mb	40ms	3.5"HH	\$2295
650mb Cartridge			\$95

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ONE MO CARTRIDGE AND HAVE A ONE YEAR WARRANTY.

TAPE BACK-UP DRIVES

ARDAT

MODEL	EXTERNAL
Viper 250	\$499
Viper 500	\$699
2.0gb Standard	\$1099
4.0gb - 8.0gb Compression Turbo	\$1499
90m/60m Tape	\$19/\$16

TEAC

MODEL	EXTERNAL
150mb Tape Backup Drive	\$449
600mb Tape Backup Drive	\$649
600mb / 150mb Tape Cassette	\$25/\$20

ALL TAPE BACKUP DRIVES COME BUNDLED WITH FREE RETROSPECT V.2.0,
ONE TAPE AND HAVE A ONE YEAR WARRANTY.



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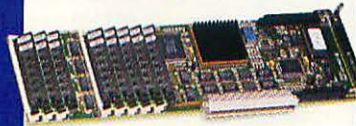
Enjoy all the benefits of a Bernoulli with the flexibility to read and write to disks of many capacities - 35MB, 65MB, 105MB, and 150MB. And the MultiDisk 150 is downward compatible so it reads and writes to 90MB disks and reads 44MB disks. You get unlimited storage expandability, lock-away security, and transportability. The patented Bernoulli design resists head crash and the sturdy disks can survive a drop of eight feet! This Bernoulli is internally terminated with a single external SCSI connector, so it must be installed as the last device on your SCSI chain. It comes with the Iomega Driver and Workshop utility and free shareware. (#5609, IOMEGA)

Minimum requirements: Mac Plus, System 6.0.

\$499. MacTransportable 90 PRO (#5012)



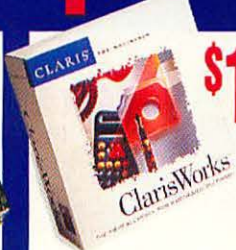
\$1898.



Radius Rocket 33MHz

Powered by Motorola 68040 CPU, a Rocket takes over computer-intensive commands, leaving your Mac's CPU free for input/output functions. And this is a great price for real performance gains, not just faster screen redraws. The Rocket 33 races along at 33MHz and has a floating point microprocessor. Mac II performance will increase by up to eight times. (#4779, Radius)

Minimum requirements: NuBus-based Mac II, 2MB RAM, System 6.0.7, a hard drive, RocketShare for Duo or IIx.



\$198.



Claris Works 2.0

This seamlessly integrated program includes word processing, graphics, spreadsheet, charting, database, and communications modules in one package. Features include a dictionary, thesaurus, text and graphics rotation, import/export of popular file formats, mail merge, and true WYSIWYG display. Online help answers your questions as you work. (#6144, Claris)

Minimum requirements: 2MB RAM, a hard drive.

\$84.



In Control 2.0

This is the new version of the 1992 Eddy Award winner. It's the only To-Do list manager that lets you organize all your activities in an outline, a prioritized list, and on your calendar. So you choose what works best for you. Includes FREE DynoPage Lite which prints pages for Day-Timers, Day Runners, and other organizers. (#5660, Attain)

Minimum requirements: Mac Plus, 600K RAM, System 6.0.5.

\$99.



Times Two

Expand your disk capacity as much as 100 percent in minutes. TimesTwo transparently compresses disk blocks, not files. So when you move a file from your TimesTwo hard disk to another device, it arrives in its original form. It's compatible with all Mac software and works with all SCSI disks. (#5233, Golden Triangle)

Minimum requirements: SE/30, 2MB RAM, System 6.0.4.

Get a SyQuest Cartridge for only \$60 with the purchase of TimesTwo. (#2269, limit 5)

\$468.

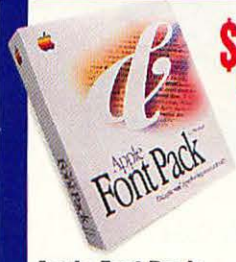


Microsoft Office CD-ROM

Get the full versions of the latest Microsoft Word, Excel, PowerPoint, and Mail for over \$1000 less than if you purchased them separately. All are full of great features like drag-and-drop editing, customizable Toolbars, keyboard shortcuts, spell-checking, and much more. And PowerPoint presentations cross platforms without translation. (#5688, Microsoft)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.5, CD-ROM drive.

\$68.



Apple Font Pack

This is a carefully chosen selection of 43 TrueType fonts. They're expertly crafted to provide excellent results - maximum legibility on screen and crisp output on paper. The Apple Font Pack includes new display, text, and symbol faces to give you a wide range of type choices. Ask about the \$15 rebate when you buy this and System 7. (#5248, Apple Computer)

Minimum requirements: Mac Plus, System 7.0, a hard disk.



\$98.



Aldus IntelliDraw Competitive Upgrade

Move to IntelliDraw from any other drawing software. Aldus IntelliDraw defines a new category of drawing program with intelligent features that give you an easy way to visually experiment, refine, and draw your ideas. Innovative smart tools link graphics in your drawing so they respond to changes automatically. Create visual "what-if" scenarios with features like intelligent clip art and dimension lines. Auto-alignment, shape blending, arrows and dashes, powerful text handling capabilities, unlimited layers, color gradients, easy object animation, slide show mode, and standard draw tools are a few of the features. It also shares files seamlessly between Mac and Windows versions. (#6191, Aldus)

Minimum requirements: Mac Plus, 2MB, System 6.0.5, 4MB RAM under System 7.



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You can paste QuickTime movies into your documents and share data with Publish and Subscribe with this full-featured favorite. And you get Grammatik 5 FREE. It checks spelling, grammar, and punctuation against 58 rules. Qualifying packages include MS Word for Mac, MacWrite II, WriteNow, FullWrite and Nisus. (#6153, WordPerfect)

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.3.

\$278. WordPerfect 2.1.3 (#4111)



Helix Express Competitive Upgrade

Manage everything from personal contacts, time and billing, mailing lists, documents – even your whole business with this fantastic value. Upgrade from any database program. Document features let you store and search for a document by a key word, then retrieve and launch it in its native format. (#6207, Helix Technologies)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.5.

\$224.

DeBabelizer

This graphics processing toolbox will save you lots of time, effort, and money. It translates from and to over 40 bit-mapped graphic file and animation formats for Mac, DOS, Windows, Silicon Graphics, Sun Microsystems, Amiga, and others. You can even edit images without the creating software. Batch processing and internal scripting functions save time by automating repetitive manipulation and editing tasks. Create QuickTime blue-screen effects with background removal features. A catalog feature lets you automatically place a series of images onto a single page. DeBabelizer will also report and display differences between original and revised images. (#6193, Equilibrium)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.5.

DE BABELIZER
THE GRAPHICS PROCESSING TOOLBOX



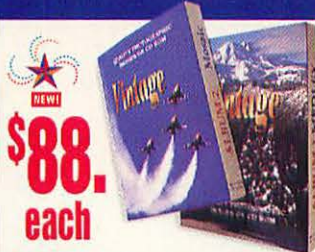
\$79.

Kai's Power Tools

Get 33 powerful generators and filter plug-ins for Adobe Photoshop, Fractal Design Painter, and others. Includes the Gradient Designer, Texture Explorer, Gradients on a Path, and four Fractal Generators.

"A landmark plug-in for Adobe Photoshop...together a creative explosion!" says Jeff Parker, Adobe Photoshop Product Manager. (#5854, HSC Software)

Minimum requirements: SE, 4MB RAM, System 6.0.5, 4MB free hard disk space, 32-bit QuickDraw.



\$88. each

Vintage Photo CDs

Vintage Quality Photographic Images on CD-ROM are albums of 300 images, each color corrected and ready for separation. When you buy an album, the images are yours to use completely royalty free. View the images of business, industry, leisure, and landscapes quickly with the interface. Four albums are available: Medley, Mosaic, All & Sundry, and Mélange. (Seattle Support Group)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.2, CD-ROM drive.

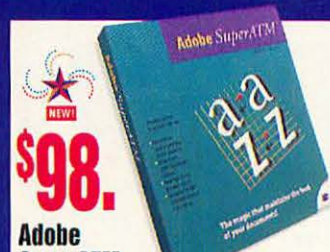


\$398.

Sketcher/ArtZ Bundle

Create realistic natural-media effects with Sketcher. Use brushes, pens, chalks, paper textures, and image processing tools to create or retouch gray scale images. The ArtZ 6x8 ADB tablet is a graphical input device on which you use the stylus as if it were a pen or brush. The stylus is cordless, batteryless, and detects 120 levels of pressure. (#6070/5355, Fractal Design Corp./Wacom Technology)

Minimum requirements: SE/30, 2MB RAM, System 6.0.5, 32-bit QuickDraw built into ROM.



\$98.

Adobe SuperATM

Eliminate jagged type on-screen and on paper. SuperATM also simulates different type styles on Macs running the same applications. This new "font substitution" feature lets you share, view, edit, or print files, and retain the typographic character and texture of the original, even if your Mac doesn't have the actual fonts. Includes five typefaces. (#6044, Adobe)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.2, 4MB RAM under System 7, a hard disk and one floppy drive, a printer.

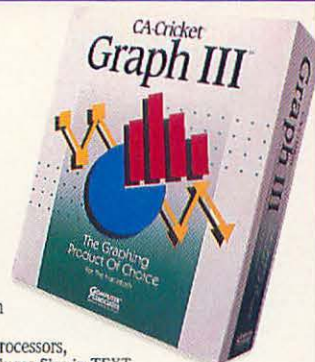
\$49. SuperATM Upgrade (#6045)

\$118.

Cricket Graph III

Convert text or data into a complete, professional-looking graph in seconds. Editing graphs is easy too – just double-click a graph component or other object, make your changes in the dialog box that appears, and view the results immediately. Import and graph data from word processors, databases, spreadsheets, or any program that produces files in TEXT, SYLK, JWKS, or WKS formats. Choose from scatter, line, stacked bar, pie, column, text, area, stacked column, double Y axes, bar, polar, quality control and overlay combinations. Customize graphs with 16 bar patterns, 48 plot symbols, six line styles, and five line widths. (#5001, Computer Associates)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.7, hard drive or second floppy drive, 2.5MB RAM under System 7.



\$149.

Environmental Clip Art

These 200 EPS images depict environmental issues such as recycling and pollution. They range from simple to complex illustrations which can be separated into more than 400 self-standing images. Add color, resize, or reshape them using any of the major applications that support the EPS format like PageMaker, Persuasion, Word, and more. (#6189, ARRO International)

Minimum requirements: A hard disk.



\$358.

ACCURA 144+ Fax 144

Everything you need to send and receive data and Group 3 faxes is here. It's a V.32bis, 14,400 bps fax/data modem which also supports 9600, 2400, 1200, and 300 bps data, plus V.42/V.42bis and MNP 5 error-control and data compression. Get up to 57,000bps throughput with V.42bis. Includes cables and fax software. (#6068, Hayes)

Minimum requirements: Mac Plus, 1MB RAM.



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SupraFAXModem 144PB

Get 14,400 bps fax and data communications on a card that fits inside your PowerBook. You can even send and receive faxes when your PowerBook is turned off. Wake Up mode turns you PowerBook on when the modem receives a call and, when combined with the included fax software, can send scheduled faxes when rates are lowest. (#5575, Supra)

Minimum requirements: PB 100, System 7.0.

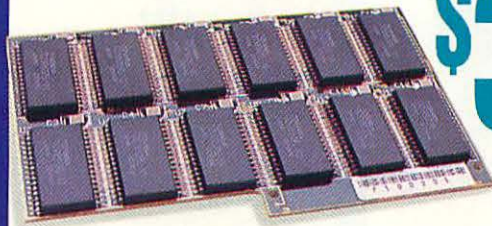


\$49.

DynoDex 3.0/ PowerBook T-shirt Bundle

This award-winning address book manager is perfect for your PowerBook. Enter information quickly. Print labels, envelopes, rotary cards, and address books for most popular personal organizers. DynoDex 3.0 synchronizes files and can dial phone numbers automatically. And you get our great PowerBook T-shirt FREE while supplies last. (#5477/6196, Portfolio Software/Mac's Place)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.4.



\$318.

PowerBook 165c 6MB RAM

Users who want to take full advantage of the 165c's color capabilities need extra memory. These new memory modules use the Apple-specified pseudo-static RAM chips to maintain the speed and warranty of your PowerBook. Extra memory will allow you to simultaneously run multiple applications such as QuickTime editing software as well as photo retouching software. Newer Technology specializes in low power consumption PowerBook memory with a card for every PowerBook, old or new. They are easy to install and were designed with all-important battery life in mind. (Module may not look exactly as shown.) (#6203, Newer Technology)

\$558. PowerBook 165c 10MB RAM (#6205)

Newer

\$92.



PB Tools/InLine Sync/ Tesseract Bundle

PBTools gives you more power, without the fluff. Know exactly how much battery life remains, and sleep your system to conserve it. Password-protection secures your PowerBook, and HotKey functions stretch keyboard power. InLine Sync updates files on your PowerBook and desktop Mac to the latest versions. Sync via file sharing, network, or SCSI connection. Tesseract has a simple but challenging premise - clear the board of colored tiles by jumping one over another in as few moves as possible. When only one tile remains on the board, a different, more difficult arrangement appears. Animated on-line help illustrates possible moves. (#6051, InLine Design)

Minimum requirement: Mac Plus, 2MB RAM, System 7.

\$28.

Clinton: Portrait of Victory

Audio speeches, music, narration, and QuickTime video complement nearly 300 photographs by award-winning TIME photojournalist P.F. Bentley. This multimedia CD-ROM is an intimate look at the Clinton campaign from the primaries, through the scandals, to the victory. Includes an epilogue by TIME chief political correspondent Michael Kramer. (#6201, Warner New Media)

Minimum requirements: Any Mac with a 13" color monitor, 4MB RAM, System 6.0.7, CD-ROM drive.

\$45.



Spectre Supreme

Jump into a 3-D tank in a cyberpunk battle world. Landscapes and scenery burst across the screen in near-movie quality animation. Face enemies like smart acid pools, cloaked robots, and deadly orbiter gauntlets. Fight back with smart missiles, proximity mines, and spinners. QuickTime and high-quality digitized sounds elevate the intensity. (#5951, Velocity)

Minimum requirements: SE, 4MB RAM, System 6.0.7.

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Battle Chess Enhanced CD-ROM

"Every chess player will want a copy of this program. Highly recommended." - Computer Gaming World. This CD-ROM brings the game to life with a magnificent chess logic system dramatic three-dimensional animations, a musical score, superb sound effects, and a complete talking tutorial. Includes modem capability for long-distance games and ten levels of play. (#6202, Interplay)

Minimum requirements: CD-ROM drive.

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CD-ROM ToolKit

This utility replaces your CD-ROM drive's original software, transparently speeding up CD-ROM operations up to 1000 percent, improving compatibility, and allowing you to play audio CDs. There are no boards, cables, or cards to install. The CD-ROM ToolKit transparently caches CD-ROM information to your hard disk so mounting, folder opening, seeks, and searches happen instantly. (#5731, FWB)

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.4, CD-ROM drive.

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Minimum requirements: Two TransTalk.



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Minimum requirements: Mac Plus, 1MB RAM, System 6.0.2.

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Square One

Store all of your favorite files in an easy-to-use icon palette. To access a file, just double click on its icon. To switch between running applications, just click the Active Applications palette once. No more time wasted rummaging through your hard drive, and no goofy hierarchical menus. Just point and click with Square One. (#5180, Binary)

Minimum requirements: Plus, 2MB RAM, System 7.

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Minimum requirements: Mac Plus, 2MB RAM, System 6.0, hard disk.

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Icon Gallery

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Minimum requirements: Mac Plus, 2MB RAM, System 7, 8-bit or gray scale monitor minimum recommended.



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Bose RoomMate Speaker

The Bose RoomMate Computer Monitor provides room-filling sound for your computer system. Bose, the world leader in innovative audio products, offers advanced audio performance for presentations and desktop use. Distortion-limiting circuitry ensure lifelike sound at virtually any listening level. Active equalization delivers full rich bass, balanced midrange, and crisp clear highs. And magnetic shielding prevents interference with your video monitor and storage media. The RoomMate connects directly to your CD-ROM audio output or computer earphone jack, and includes connectors for both stereo and mono systems. While it requires minimal desk space, optional mounting accessories can position it up off your desk. (#6197, Bose Corporation)

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Minimum requirements: Mac Plus, 1MB RAM, System 6.0, hard drive.

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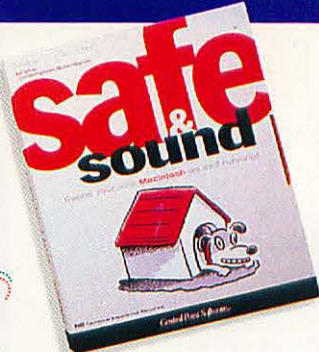
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Minimum requirements: Mac Plus, 2MB RAM, System 6.0.5.





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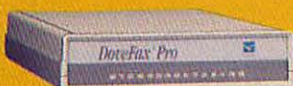
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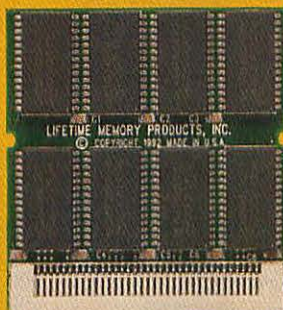
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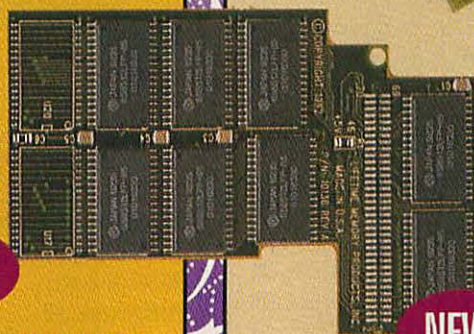


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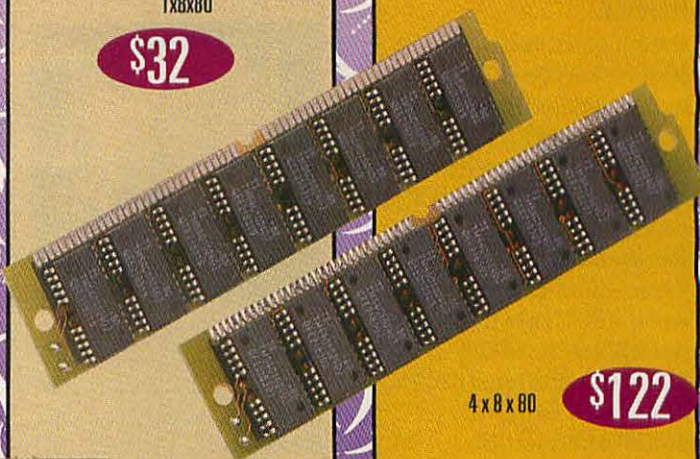
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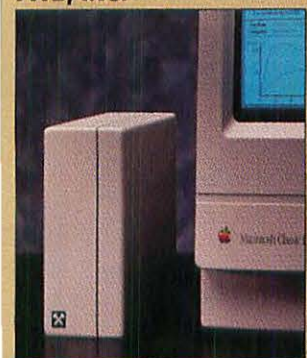
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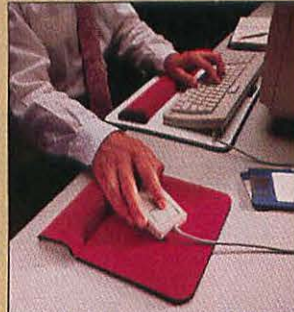
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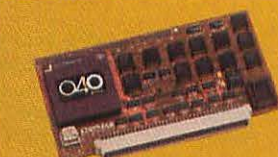
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2.0GB M2652SA	5.25 FH	14.5	\$2289
2.4GB M2654SA	5.25 FH	14.5	\$2489
• Five year warranty			
QUANTUM			
42MB ELS42	3.5 1"	19	\$175
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240MB LPS240	3.5 1"	10	\$409
525MB LPS525	3.5 1"	10	\$909
700MB PRO700	3.5 HH	10	\$1189
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80MB Go•Drive	2.5	17	\$325
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160MB Go•Drive	2.5	17	\$519
• ELS, LPS, PRO drives have two year warranty			
• GO•drives have one year warranty			
SYQUEST			
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88MB IMS 88MB External		Dual	\$729
88MB IMS 88c External			\$489
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88MB SyQuest SQ800 Cartridge			\$64
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• Drives have two year warranty			
MAXTOR			
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535MB LXT-535	3.5 HH	12	\$959
540MB MXT540SL	3.5 HH	8.5	\$1059
1.2GB MXT1240S	3.5 HH	8.5	\$1649
1.2GB PO-12S	5.25 FH	13	\$1399
1.7GB P1-17S	5.25 FH	13	\$1699
• 3.5" drives have one year warranty			
• 5.25" drives have two year warranty			
SEAGATE			
1.2GB ST11200N	3.5 HH	10.5	\$1545
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1.6GB ST41600N	5.25 FH	11.5	\$1999
2.4GB ST42400N	5.25 FH	11	\$2879
3.4GB ST43400N	5.25 FH	11	\$3929
• Drives have one year warranty			
MICROPOLIS			
660MB 1624	5.25 HH	14.5	\$1269
1.0GB 2112	3.5 HH	10	\$1689
2.0GB 1924	5.25 FH	10	\$2849
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12"x 18" Electrostatic \$1059

TWINCOM

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Int. 2400/data. 9600/
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Int. 14.4 data/fax \$299

PSI

Modems
COMstation One \$139
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COMstation Four \$349
COMstation Five \$419
PowerModem I \$139
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TransWarp 1300 40MHz \$259 w/FPU \$469

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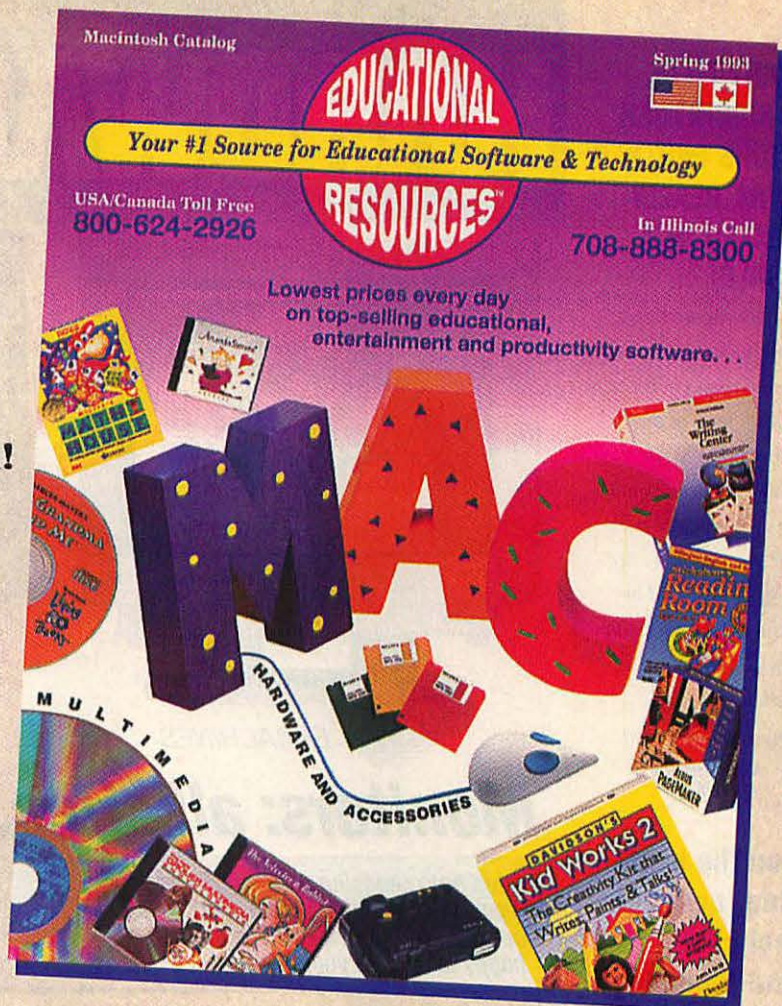
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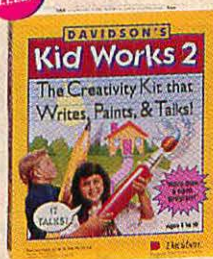
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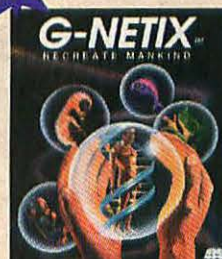
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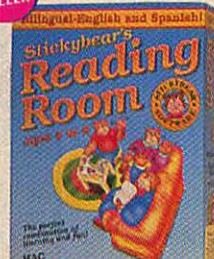
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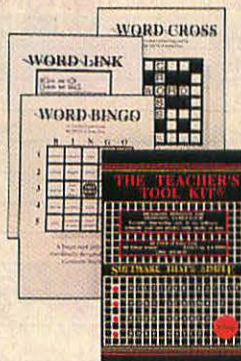


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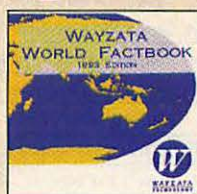


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NEC 21" 6FG Color	2,429	NEC							
SuperMac 21" Mono/Grayscale	989	—							
B. SuperMac 20" (SuperMatch)	\$1,499	Hitachi							
C. RasterOps 20" Trinitron Multi-Mode	2,329	Trinitron							
D. RealTech 20" Trinitron Multi-Mode	1,895	Trinitron							
Radius Precision Color 20"	2,389	Trinitron							
RasterOps 20" Hitachi Color	1,469	Hitachi							
* SuperMac 20" (SuperMatch Dual-Mode)	2,499	Trinitron							
E-Machines 19" Color (T19 II)	2,399	Trinitron							
E. Mitsubishi 17" Diamond Pro	\$1,199	Trinitron							
F. NEC 17" 5FG Color	1,329	NEC							
G. Sony 17"	1,149	Trinitron							
H. RealTech 17" Multi-Mode	995	Hitachi							
I. Seiko Instruments 17" CM1760LR	1,249	Trinitron							
J. RasterOps 16" (RasterOps Sweet 16)	\$1,249	Panasonic							
* E-Machines 16" Color (ColorPage T16)	1,299	Trinitron							
K. NEC 15" 4FG Color	789	NEC							
L. Radius 15" Precision Color Pivot	\$959	Non-Trinitron							
M. Sigma 15" Grayscale (PageView GS)	579	Phillips							
N. RealTech 15" Grayscale	449	—							
Sigma 15" Grayscale (Power Portrait)	659	Phillips							
NEC 15" 3FGX Color	669	NEC							
O. Seiko Instruments 14" Color (CM1445)	\$499	Trinitron							
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Dpi Engine speed RAM Interpreter Microprocessor Duty cycle Paper trays SCSI port Interfaces Resident fonts Misc.

Do you need to print complex graphics on a daily basis or large quantities of high-quality, time-sensitive documents? We can recommend the right printer for your needs.

NEC Silentwriter Model 95

\$1,399

Lease: \$38/month

- 300 dpi
- 6 pages/min.
- 2 Mb RAM (expandable to 5 Mb)

- Adobe PostScript Level 2
- Motorola 68000 processor

- 6,000 pages per month
- Built-in envelope feeder & 250-sheet tray; optional 2nd tray available in letter or legal sizes

- No SCSI port
- Appletalk RS-422, parallel, and RS-232C

- 35 Micro-fine toner and NEC's patented "Sharp Edge" technology create sharp black print quality

NEC



RealTech Laser Plus

\$1,449

Lease: \$40/month

- 300 dpi
- 9 pages/min.
- 3 Mb RAM (expandable to 10 Mb)

- Adobe PostScript Level 2
- Weitek RISC processor

- 5,000 pages per month
- Optional 2nd paper tray & cassette feeder are available for \$250 (for both)

- SCSI port
- Appletalk RS-422, parallel, and RS-232C.

- 35 ATM font rendering technology builds raw type characters 4 to 5 times faster, enabling the RealTech Laser to print complex documents faster than other printers in its price range.

RealTech Laser Plus

\$1,449

Lease: \$40/month

Reprinted from MacWeek, Sept. 1992. Copyright ©1992, Ziff Communications Co.

★★★★1/2

"The RealTech features not just a genuine Adobe interpreter, but also a PostScript Level 2 raster image processor (RIP), which earns it more than a few points for forward compatibility."

— PUBLISH MAGAZINE, Feb. 1992

Texas Instruments MicroLaser XL Turbo

\$2,795

Lease: \$77/month

- 300 dpi
- 16 pages/min.
- 2.5 Mb RAM (expandable to 10.5 Mb)

- Adobe PostScript Level 2
- Weitek RISC processor

- 25,000 pages per month
- Optional 2nd paper drawer

- Optional SCSI port
- Appletalk RS-422, parallel, and RS-232C

- 35

TEXAS INSTRUMENTS



Texas Instruments MicroLaser Plus

\$1,099

Lease: \$30/month

- 300 dpi
- 9 pages/min.
- 1.5 Mb RAM (expandable to 4.5 Mb)

- Adobe PostScript Level 1
- Motorola 68000 processor

- 10,000 pages per month
- Optional 2nd paper drawer and envelope feeder

- Optional SCSI port
- Appletalk RS-422, parallel, and RS-232C

- 17 Available with 35 resident fonts (\$1349)

newgen

★★★★

- 600 dpi
- 8 ppm (letter size); 4.6 ppm (tabloid size)
- 12 Mb RAM (expandable to 96 Mb)

- PostScript compatible
- Weitek XL-8220 RISC processor

- 10,000 pages per month
- Optional 2nd paper drawer

- SCSI port
- Appletalk RS-422, parallel, RS-232C

- 35

NewGen 660B

\$4,059

Lease: \$111/month

The only 11x17 printer with Adobe PostScript Level 2 for less than \$3500.



- Choice of 300 or 400 dpi
- 15 ppm (letter size); 8 ppm (tabloid size)
- 4 Mb RAM (expandable to 16 Mb)

- Adobe PostScript Level 2
- Weitek RISC processor (and ATM font rendering technology)

- 30,000 pages per month
- Two paper trays included (one tray for letter size; one tray for tabloid size.)

- SCSI port
- Three interface ports: Appletalk RS-422, IBM PC parallel, and RS-232C.

- 35

Jeanne is thrilled that she can print proofs of her company newsletter on tabloid-size paper. No more tiling!

RealTech Laser 400

\$3,195

Lease: \$88/mo.

"...be forewarned: PostScript-clone printers still have a long way to go before they can rival true Adobe PostScript printers."

Quote from MacUser September 1992 issue, "Personal PostScript Printers" by Bruce Fraser.

★★★★ MACWORLD MAGAZINE September 1992

QMS 860 Hammerhead*

\$4,279

Lease: \$117/mo.

- 600 dpi
- 8 ppm (letter size); 4.6 ppm (tabloid size)
- 12 Mb RAM (expandable to 32)

- Adobe PostScript compatible
- Intel 80960CA RISC processor

- 10,000 pages per month
- Optional 2nd paper cassette

- SCSI port
- Optional Ethernet
- 39 fonts

Three interface ports: Appletalk RS-422, IBM PC parallel, and RS-232C.



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25 MHz FastCache Turbo 040 **259**

33 MHz FastCache Turbo 040 **339**

Universal PowerCache Accelerators
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Charger **\$799**

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MacCon 3 Card **\$209**

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Includes an RJ-45 jack for 10Base-T wiring.

DaynaPORT E/I-T NuBus Card **\$149**

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TeleBridge	589

Dayna EtherPrint

Supports AppleTalk Phase 1 and Phase 2 protocols; divide your network into multiple zones.

Dayna EtherPrint **\$335**
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MODEMS

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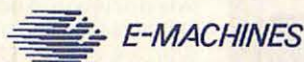
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CENTRIS 650 SYSTEMS

Centris 650, 8 Mb of RAM, 80 Mb hard drive, Sony 17" Color monitor, and Key Tronic MacPro Plus extended keyboard **\$4075**

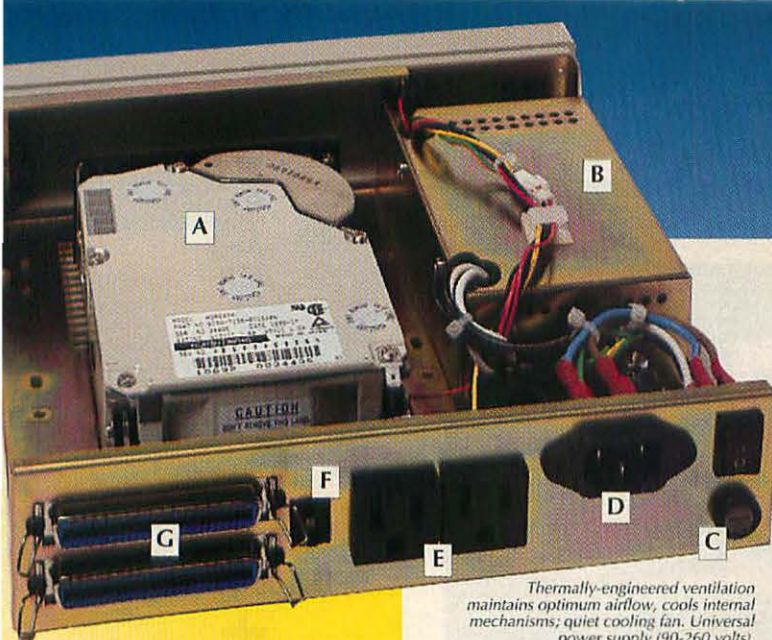
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G. Two 50-pin SCSI connectors for simple configuration

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MAXOPTIX

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	Model number	Price (Internal)	Price (External)	Formatted Mac capacity	Avg. access time	Transfer rate*	MTBF** (hours)	Form factor	Warranty (years)
1.1 - 3.6 Gb									
Fujitsu 1.2	M2266	\$1395	\$1495	1079 Mb	14.5 ms	3.0 ¹	200,000	5.25 FH	5
HP 1.2	C2247	1589	1659	1000 Mb	10.5 ms	5.3 ¹	300,000	3.5 HH	5
Micropolis 1.2	M2112	1449	1519	1005 Mb	10 ms	5.0 ¹	300,000	3.5 HH	5
Quantum 1.2	PRO1225	1599	1669	1200 Mb	10 ms	2.9 ¹	350,000	3.5 HH	2
Seagate 1.2	ST41200N	1369	1469	999 Mb	15 ms	3.0 ¹	150,000	5.25 FH	1
Toshiba 1.2	MK-538FB	1399	1469	1200 Mb	12.5 ms	4.0 ¹	200,000	3.5 HH	3
Maxtor 1.2	MXT-1240	1549	1619	1240 Mb	9 ms	4.5 ¹	300,000	3.5 HH	3
Conner 1.3	CP-31370	\$2099	\$2169	1030 Mb	10.5 ms	6.0 ¹	250,000	3.5 HH	1
Micropolis 1.5	M1528	2299	2399	1341 Mb	14.5 ms	2.9 ¹	150,000	5.25 FH	5
Micropolis 1.6	M1548	2379	2479	1748 Mb	14 ms	4.8 ¹	150,000	5.25 FH	5
Seagate 1.6	ST41651N	1899	1999	1352 Mb	15 ms	4.0 ²	150,000	5.25 FH	1
Fujitsu 2.0	M2652	\$2449	\$2549	1752 Mb	11 ms	4.8 ²	200,000	5.25 FH	5
Micropolis 2.0	M1924	2649	2749	2100 Mb	11.5 ms	4.8 ²	250,000	5.25 FH	5
Seagate 2.1	ST42100N	1999	2099	1900 Mb	12.9 ms	3.9 ²	150,000	5.25 FH	5
Seagate 2.4	ST42400N	2879	2979	2050 Mb	11 ms	4.5 ²	150,000	5.25 FH	5
HP 2.4	C3010	2899	2999	2000 Mb	11.5 ms	5.3 ²	300,000	5.25 FH	5
Seagate 3.4	ST43400N	3999	4099	2750 Mb	11 ms	6.0 ²	200,000	5.25 FH	5
Micropolis 3.6	M1936	4199	4299	3022 Mb	12 ms	6.0 ²	250,000	5.25 FH	5

* Transfer rate (or throughput) depends on your Mac CPU and system configuration. For more information, ask your Hardware That Fits sales partner. **MTBF=Mean Time Between Failure HH=Half Height FH=Full Height

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Conner 85	CP-30080E		\$209	\$279	82 Mb	17 ms	1.5	150,000	3.5 LP	1
Quantum 85 ELS	ELS85		209	279	82 Mb	17 ms	1.4	250,000	3.5 LP	2
Conner 120	CP-30100		279	349	116 Mb	17 ms	1.5	150,000	3.5 LP	1
Maxtor 120	7120XT		239	309	121 Mb	15 ms	1.5	150,000	3.5 LP	2
120 - 250 Mb										
Quantum 127 ELS	ELS127		\$279	\$349	124 Mb	17 ms	1.4	250,000	3.5 LP	2
Conner 170	CP-30170E		289	359	160 Mb	9 ms	1.5	150,000	3.5 LP	1
Quantum 170 ELS	ELS170		299	369	160 Mb	17 ms	1.4	250,000	3.5 LP	2
Conner 212	CP-30200		369	439	206 Mb	12 ms	2.5 ¹	150,000	3.5 LP	1
Maxtor 213	7213		339	409	207 Mb	15 ms	2.8	150,000	3.5 LP	2
Quantum 240	LPS240		389	459	234 Mb	10 ms	1.4	250,000	3.5 LP	2
Maxtor 245	7245		369	439	245.6 Mb	15 ms	3.0	150,000	3.5 LP	2
Seagate 248	ST3283N		519	589	235 Mb	12 ms	3.0 ²	250,000	3.5 LP	1
320 - 560 Mb										
Maxtor 340	LXT-340		\$599	\$669	324 Mb	15 ms	2.1 ²	150,000	3.5 HH	2
Fujitsu 425	M2623FA		899	969	405 Mb	9 ms	2.7 ¹	200,000	3.5 HH	5
Seagate 426	ST1480N		919	989	426 Mb	14 ms	2.6 ¹	150,000	3.5 HH	1
Fujitsu 520	M2624FA		939	1009	496 Mb	9 ms	2.7 ¹	200,000	3.5 HH	5
Quantum 525 LPS	LPS525		959	1029	500 Mb	10 ms	3.2 ¹	250,000	3.5 LP	2
Seagate 525	ST1581N		1029	1099	525 Mb	14 ms	4.0 ²	150,000	3.5 HH	1
Maxtor 540	MXT-540		989	1059	546 Mb	9 ms	5.5 ¹	300,000	3.5 HH	2
Conner 540	CP-3540		899	969	515 Mb	12 ms	5.5 ²	150,000	3.5 HH	1
Micropolis 560	M2105		1069	1139	560 Mb	10 ms	5.0 ²	300,000	3.5 HH	5
660 Mb - 1.05 Gb										
Seagate 663	ST4766N		\$1119	\$1219	645 Mb	15.5 ms	1.8	150,000	5.25 FH	1
Seagate 676	ST4767N		1519	1619	645 Mb	11.9 ms	3.0 ¹	150,000	5.25 FH	1
HP 677	97556		1469	1569	620 Mb	13.5 ms	2.8 ¹	150,000	5.25 FH	5
Quantum 700	PRO700		1249	1319	700 Mb	10 ms	2.9 ¹	350,000	3.5 HH	2
Toshiba 877	MK-438FB		1099	1169	830 Mb	12.5 ms	3.0 ¹	200,000	3.5 HH	2
Quantum 1050	PRO1050		1419	1489	1000 Mb	10 ms	2.9 ¹	350,000	3.5 HH	2
HP 1050	97558		2099	2199	987 Mb	13.5 ms	2.8 ¹	150,000	5.25 FH	5
Seagate 1050	ST11200N		1649	1719	1000 Mb	10.5 ms	5.1 ²	200,000	3.5 HH	1

* Transfer rate (or throughput) depends on your Mac CPU and system configuration. For more information, ask your Hardware That Fits sales partner. **MTBF=Mean Time Between Failure LP=Low Profile HH=Half Height FH=Full Height

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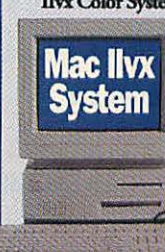
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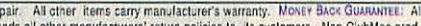
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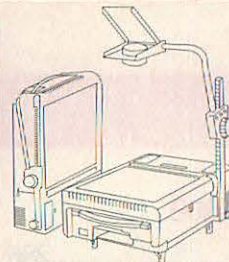
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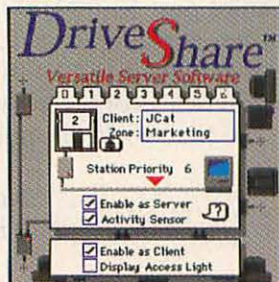
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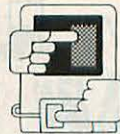
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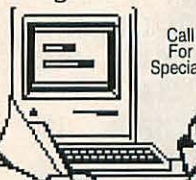
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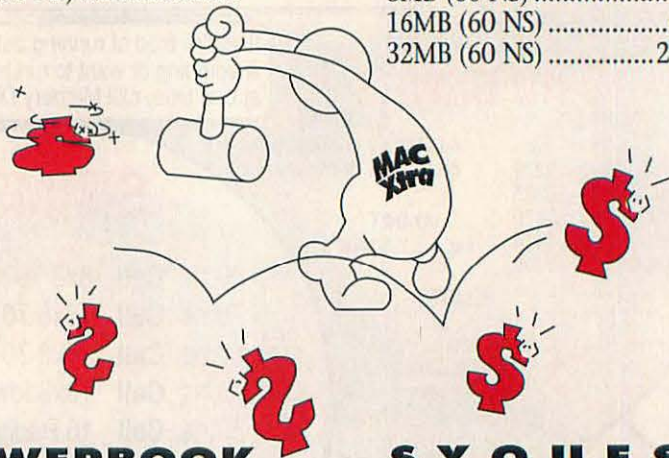
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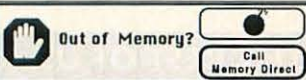
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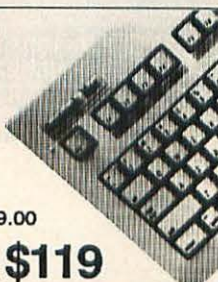
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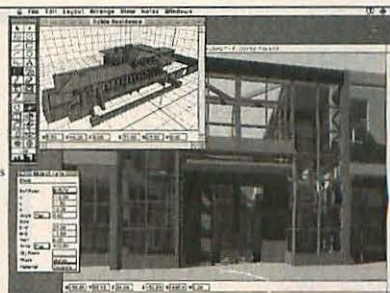
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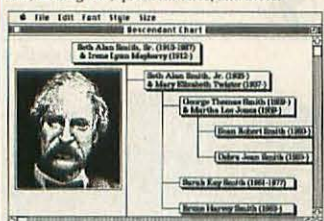
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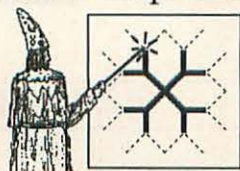
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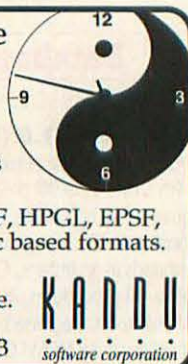
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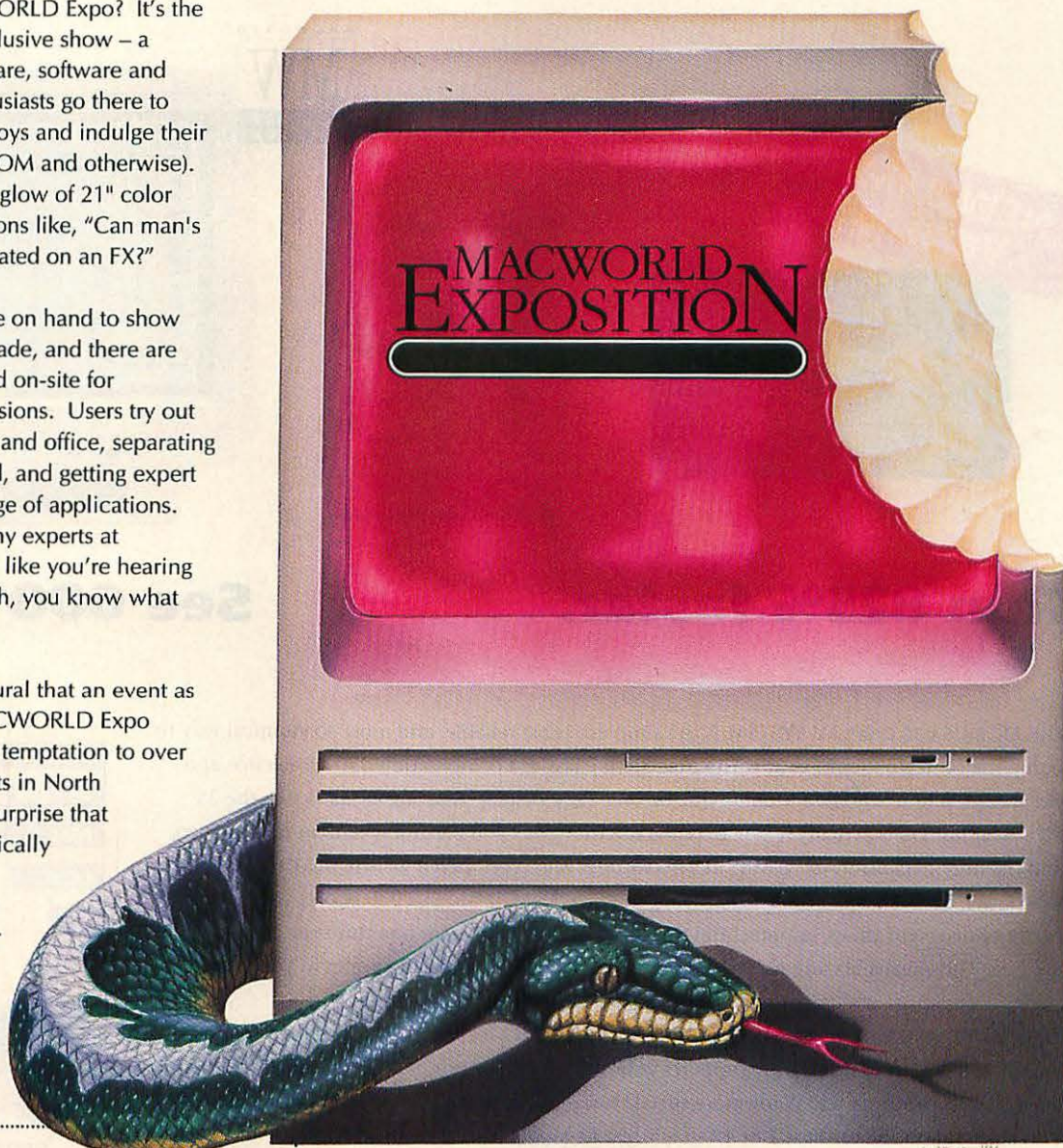
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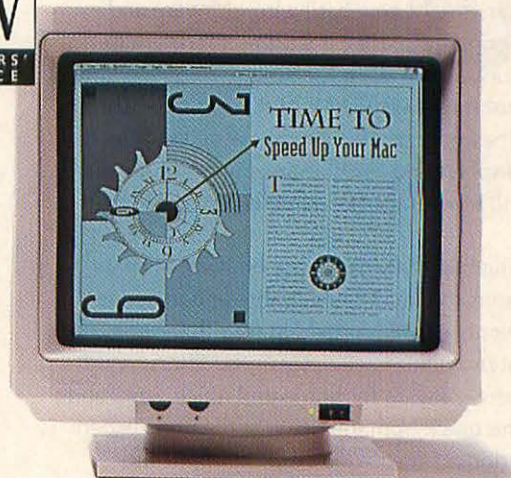
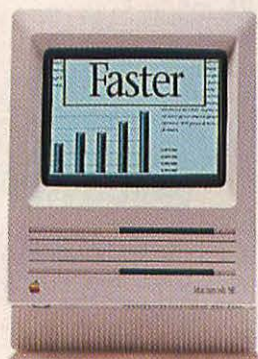
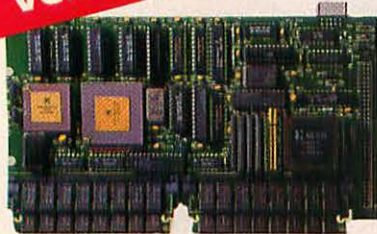


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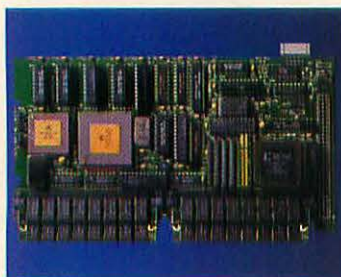
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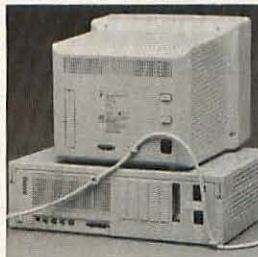
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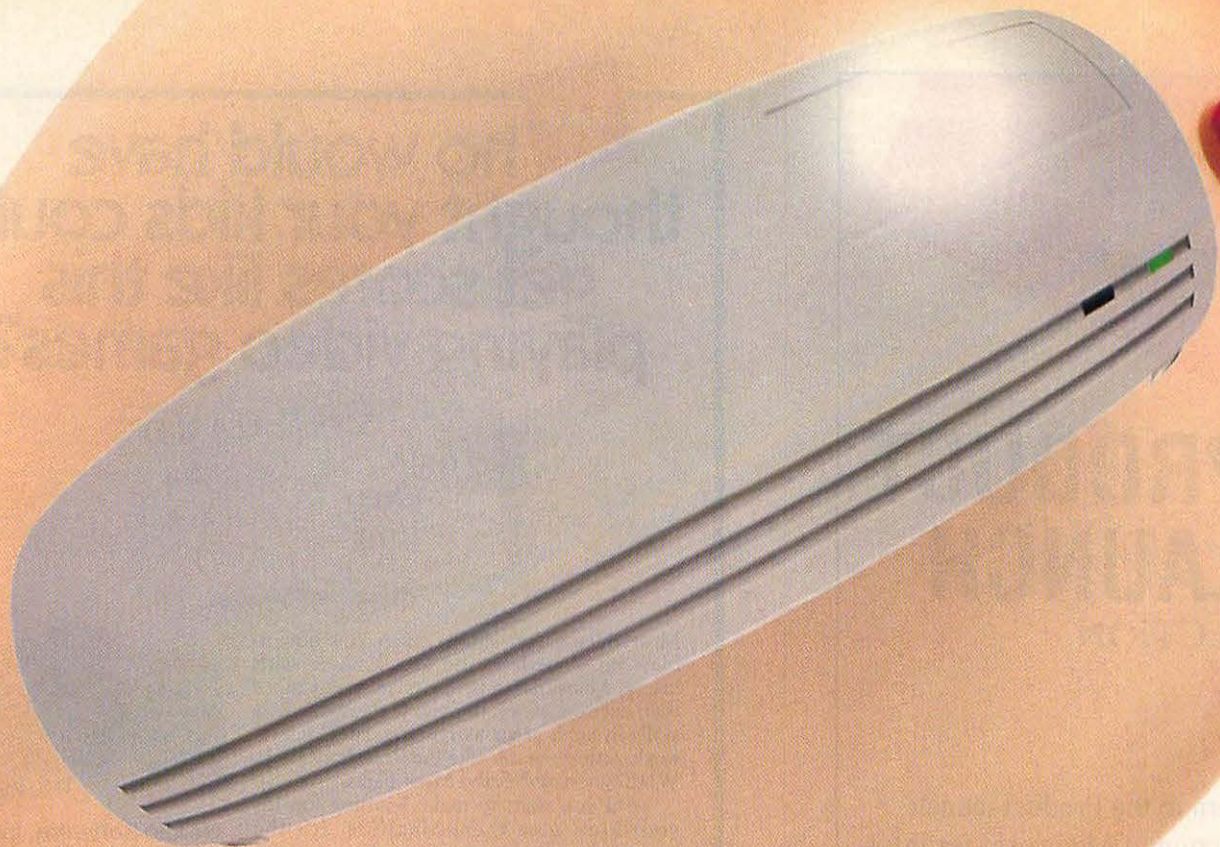
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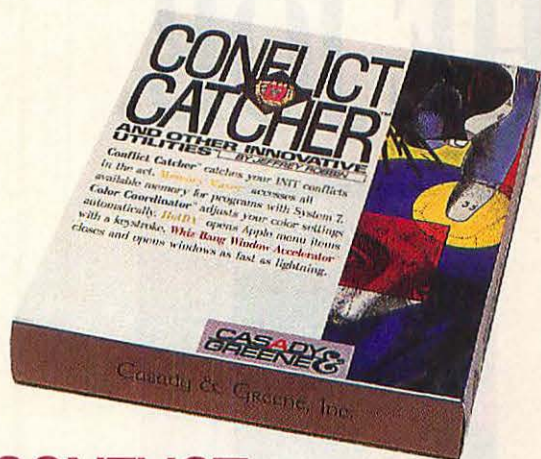
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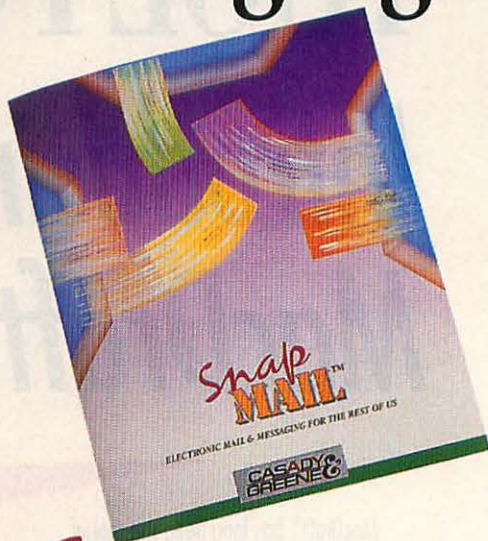
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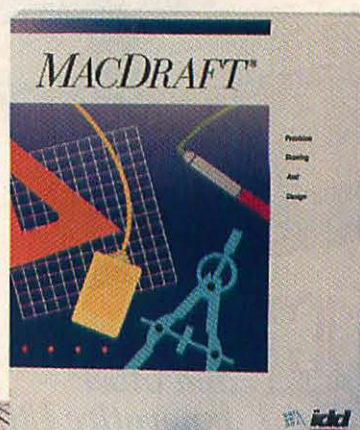
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The Akihabara Syndrome

BY GUY KAWASAKI

THERE IS A DISTRICT IN TOKYO called Akihabara. By railroad, it's two stops from the Tokyo station on the Yamanote line. Akihabara contains seven-story stores as well as five-by-five-foot stalls. In these stores and stalls you can buy every imaginable (and unimaginable) television, VCR, video camera, tape recorder, computer, CD player, household appliance, and electronic component.

It's hip for the executives of American computer firms like Apple to talk about visiting Akihabara. They come back to America and exclaim, "I was just in Tokyo, and I went to Akihabara. You should see the selection of stuff they have there. They sell more kinds of Walkmans than Apple has reorgs." If you're not familiar with Apple reorgs, I apologize; this means there are a lot of Walkmans.

Here's the problem: Apple executives go to Akihabara and their round eyes glaze over and their Protestant brains short out. This is called The Akihabara Syndrome. Then these executives come back to Cupertino and design too many kinds of Macintoshes. As a result, the hardest thing about buying a Macintosh is figuring out which one to choose (or more accurately, which one to wait for).

Which PowerBook?

SIX MONTHS AGO, I WAS A VICTIM OF The Akihabara Syndrome. I was interviewing someone for my next book, and she told me she was about to buy a laptop for her daughter. She had gone to a computer store, and the store gave her a quote of \$2200 for a generic clone laptop running the Gates User Interface (GUI).

You can take the evangelist out of Apple, but you can't take Apple out of the evangelist, so I quickly told her she was making a mistake. I asked her if she loved her daughter. I told her it would hurt me to see her waste \$2200. Naturally, she came back with the dreaded question, "Well, which laptop should I buy?"

"Why, a Macintosh PowerBook," I responded confidently, and then I thought, "Oh no, she's going back to the store and she'll tell this to a guy who doesn't know a spreadsheet from Shinola, and he's going to tell her a clone running

the Gates User Interface 'is just like a Macintosh, only cheaper.'" I had to tell her which PowerBook to buy, so she wouldn't have to ask any questions at all.

Which Macintosh should she buy? I had to get back to her. The 180 costs twice what she was quoted. The 140 was just discontinued. The 145 wasn't shipping. The docks and external drives for the Duo 210 and 230 weren't available yet. The 160 was the right price, but I hated the screen.

I had to call two people to ask their advice. Imagine that: Guy Kawasaki, four-year Apple employee, former director of software product management, the person who's forever taking credit for the plethora of Macintosh software, a legend in his own mind, had to ask two people for advice on which Macintosh to buy. We came to the conclusion that she should buy a 160 and hope she never looks at the screen of a 170 or 180.

Then Which Macintosh?

AS OF MARCH 1993, THERE ARE SIX MODELS of PowerBooks and nine models of desktop Macintoshes—not even counting the Performas. This is crazy—why doesn't Apple ship 3 models instead of promising 15? Exercise: send an E-mail to John Sculley and ask him which Macintosh he recommends to his in-laws.

Here's the Kawasaki Solution to The Akihabara Syndrome: Bless three models so their sales go through the ceiling, and Apple will discontinue the rest.

Blessed Macintosh #1: Color Classic 4/80. Market: the ideal first Macintosh for the most of us. Suggested retail price: \$1389. If Steve Jobs were still at Apple, this is the Macintosh he would have designed. It would cost three times as much and wouldn't come out until 1995, but he would have designed it. This Mac best captures the essence of the Macintosh Way: compact design, plug-and-play, and puppylike in charm.

Blessed Macintosh #2: PowerBook 160 4/80. Market: businesspeople who travel. Suggested retail price: \$2789.

Let's face it. You buy a PowerBook to use when you travel. A traveling computer has two minor requirements: it has to work with a modem (and there have to be modems available that you can actually buy), and it has to run on batteries for at least an hour. The screen on the 160 will drive you crazy, but if enough people buy it, Apple will have to lower the price of the 180. Then we'll bless the 180.

Blessed Macintosh #3: Centris 650 8/80. Market: businesspeople who don't travel. Suggested retail price: \$3189. This is the desktop model for most of us: it is powerful enough for most applications in the real world, and you can add a full-page or two-page display. Sure, we'd all like a Quadra, but how fast do you really need to scroll that five-page memo?

Be prepared to take some flak. First, people will disagree with the Color Classic as the ideal first Macintosh because it isn't as expandable as the LC II or LC III. Tough. Macintoshes are like cars—either you're happy with the one you have or you buy a new one; you don't upgrade them. Second, Apple executives are going to whine: "You tell us you want us to innovate, so we innovate. We're introducing more models this year than in the entire history of Apple." Nice try. Wake up and smell the wasabi: we want paradigm-shifting, leapfrogging innovation, not a change in clock speed.



*If we bless
three
Macintoshes,
Apple
will discontinue
the rest*

The Ginza Syndrome

CAN WE STOP THE AKIHABARA Syndrome? It may be too late. But look at the bright side: if all those Apple execs caught the Marunouchi line and got off at the Ginza stop, they'd see two dozen strawberries (admittedly, perfect strawberries) selling for \$50 in a Japanese department store. God help us if they catch The Ginza Syndrome. **m**

GUY KAWASAKI's views are his own and only sporadically represent those of Macworld. His latest book is *The Computer Curmudgeon* (Hayden Books, 1992). He has investments in After Hours Software, Objective Software, Global Village Communications, Bookmaker Corporation, and others.

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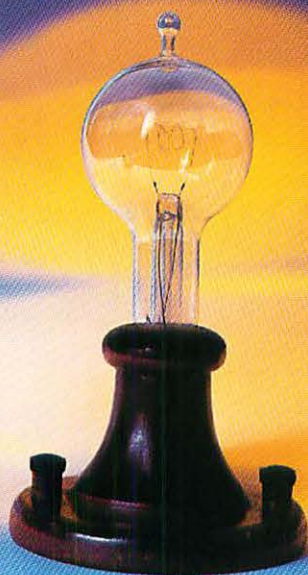
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